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THE CONDOR

A Magazine of Western Ornithology



Volume XXXV

July-August, 1933

Number 4



COOPER ORNITHOLOGICAL CLUB

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A Magazine of Western Ornithology

Published Bi-monthly by the Cooper Ornithological Club

Entered as second-class matter May 15, 1925, at the post-office at Berkeley, California,
under Act of Congress of February 28, 1925, Section 412, paragraph 4.

Issued from the Office of THE CONDOR, Museum of Vertebrate Zoology, Berkeley, California.

SUBSCRIPTION RATES

Three Dollars per Year in the United States, payable in advance.

Fifty Cents the single copy.

Three Dollars and Twenty-five Cents per Year in all other countries in the International Postal Union.

COOPER ORNITHOLOGICAL CLUB

Dues are payable in advance on January first for the calendar year: Three Dollars per year for members residing in the United States; Three Dollars and Twenty-five Cents in all other countries. Members whose dues are paid receive THE CONDOR without additional charge.

The Life Membership fee is Seventy-five Dollars. No additional dues are required, and the money is invested and the interest only is used for Club publications. Life Members receive The Condor without additional charge.

Send manuscripts for publication to the Editor, J. GRINNELL, Museum of Vertebrate Zoology, Berkeley, California, or to either of the Associate Editors, JEAN M. LINDSAY and ALDEN H. MILLER, same address.

Send dues and subscriptions to JOHN McB. ROBERTSON, Associate Business Manager, Buena Park, California; orders for back numbers of THE CONDOR and the PACIFIC COAST AVIFAUNA series to W. LEE CHAMBERS, Business Manager, 2068 Escarpa Drive, Eagle Rock, California.

Issued July 15, 1933

CONTENTS

	PAGE
The Midsummer Status of Certain Birds in the Southern California Lowlands.....John McB. Robertson	133
Notes on the Anatomy and Breeding Habits of Crossbills.....Thomas T. McCabe and Elinor B. McCabe	136
Frigate-birds of the West American Coast (with illustration).....H. S. Swarth	148
The Span of the Nesting Season of Birds in Butte County, California, in Relation to their Food (with illustration).....William B. Davis	151
The Nesting Season of Birds in Doniphan County, Kansas (with two illustrations).....Jean M. Linsdale	155
FROM FIELD AND STUDY	
A Peculiar Feeding-Habit of the Short-billed Gull.....Laidlaw Williams	161
Three Magpies Rob a Golden Eagle.....Joseph S. Dizon	161
The Eastern Brown Thrasher at Altadena, California (with illustration).....A. J. van Rossem	161
Winter Occurrence of Turkey Vultures in the Napa Valley, California.....Emerson A. Stoner	162
The Long-eared Owl as a Ratter.....Paul L. Errington	163
Records from North Central Arizona.....Alexander Wetmore	163
Nocturnal Singing of the Western Meadowlark.....Winton Weydemeyer	164
White-crowned Sparrow Records from Southern California.....John McB. Robertson	164
The Vulture's Fair-way (with illustration).....J. Grinnell	164
Phainopepla Observed on Barley Flats, San Gabriel Mountains, California.....L. E. Hoffman	166
Black Phoebe Nesting in a Tree.....John McB. Robertson	166
Tracing Fall Wandering by an Albino.....Roland Case Ross	166
Bird Notes from Southwestern Oregon.....James Stevenson and Henry Fitch	167
EDITORIAL NOTES AND NEWS	
John G. Tyler (Photograph).....	168
MINUTES OF COOPER CLUB MEETINGS	
Eighth Annual Meeting.....	169
Governors' Meeting.....	171
	171





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A BI-MONTHLY MAGAZINE OF
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THE MIDSUMMER STATUS OF CERTAIN BIRDS IN THE SOUTHERN CALIFORNIA LOWLANDS

By JOHN McB. ROBERTSON

The postbreeding season altitudinal migration of many of the lowland birds contributes a conspicuous part of the midsummer bird life of the mountain ranges of southern California. This up-mountain movement is discussed at some length by Grinnell in his "Biota of the San Bernardino Mountains" (Univ. Calif. Publ. Zool., 5, 1908, pp. 22-26); he attributes the movement to the diminishing food supply, caused by the drying up in the summer heat of the plant life that, either directly or indirectly, has furnished food for these lowland birds during the nesting season. He likens the period from July to October in the coastal lowlands to the winter season, as far as food supply for a number of the summer visitant and permanently resident species is concerned.

This condition was probably more pronounced in the past than at the present time, because of the changes that have been brought about by the agricultural and urban settlement of the greater part of the coastal lowlands, with the attendant irrigation and culture of a great variety of crops, orchards and shrubbery. Even uncultivated areas are, in many cases, grown up to alien plants that have been introduced by man. Exotic food supplies are now present for many of the birds and it takes only cursory observation to find some of the species present in the lowlands in considerable abundance at the very time that others of their race are moving up mountain to take advantage of the retarded season at higher elevations.

As an example, considerable areas grown up to tree tobacco (*Nicotiana glauca*) furnish abundant food for hummingbirds almost the year around. On July 22, 1928, in such an area, in the Fish Cañon wash, at the base of the Sierra Madre mountains, east of Monrovia, California, the late J. Eugene Law and myself found hummingbirds to be extremely abundant. Between daylight and 8 a. m. we were able to identify adult males of the following species: Black-chinned (*Archilochus alexandri*), Costa (*Calypte costae*), Anna (*Calypte anna*), Rufous (*Selasphorus rufus*), and Allen Hummingbird (*Selasphorus allenii*). At this time we found that even isolated plants of the tree tobacco along the Foothill Boulevard had their attendant hummingbirds. The Allen Hummingbird has been seen at my home as early as June 28, and by mid-July the Rufous and the Allen are to be found about the red flowers of the trumpet vine (*Bignonia cherere*) at the same time that others of their kind are frequenting the scarlet pentstemons of the high mountains.

Discussion of this subject with Mr. Law led me to make a series of observations at my home in Buena Park, California, during the summer of 1928. Four species

selected for observation were: Bullock Oriole (*Icterus bullockii*), Black-headed Grosbeak (*Hedymeles melanocephalus melanocephalus*), Black Phoebe (*Sayornis nigricans nigricans*), and Anna Hummingbird. On June 24, for one hour, 8-9 a. m., I stationed myself where I had a clear view of a group of fig trees, which at that time still had a few ripe figs of the first crop on them. During the hour eight Bullock Orioles were seen, four males, two of which were heard to sing, and two females, one of them feeding two juveniles that followed her about. No Black-headed Grosbeaks were seen during the hour of observation, but one had been seen earlier in the day. Two Black Phoebes were feeding about the barn, a short distance away, and one Anna Hummingbird was seen at the trumpet flowers near the house.

July 1, 8-9 a. m.; from the same observation point were noted one female and one juvenal Bullock Oriole, one Black-headed Grosbeak of undetermined sex, two Black Phoebes, and no Anna Hummingbirds. The first crop of figs was all gone and the real crop had not started to ripen.

July 8, 8:30-9:30 a. m.; no figs ripe; eight Bullock Orioles, two of them adult males; seven Black-headed Grosbeaks; two Black Phoebes; no Anna Hummingbirds. At this time the orioles and grosbeaks were abundant around mulberry trees at other places in the community. Two of the eight orioles were seen to feed on something in a patch of sweet corn.

July 15, 8-9 a. m.; figs not ripe; nine Bullock Orioles; sixteen Black-headed Grosbeaks "flycatching" for insects from the tops of large eucalyptus trees nearby; one Black Phoebe; one male Anna Hummingbird heard to sing three times during the hour, if the "scissors grinding" note of this species may be called a song.

July 29, 8-9 a. m.; figs and peaches ripening; nine Bullock Orioles; nineteen Black-headed Grosbeaks; two Black Phoebes at the barn; one male Anna Hummingbird at the fig trees and at least two others at the trumpet flowers. Other birds coming to feed on figs were: Arizona Hooded Oriole (*Icterus cucullatus nelsoni*), Western Mockingbird (*Mimus polyglottos leucopterus*) and the House Finch (*Carpodacus mexicanus frontalis*).

August 5, 8-9 a. m.; figs abundant; twenty-nine Bullock Orioles, two of them adult males; thirteen Black-headed Grosbeaks, two of them adult males and one a juvenile still being fed by a female; two Black Phoebes at the barn; several Anna Hummingbirds about the trumpet flowers. Arizona Hooded Orioles were at least twice as numerous as the Bullock Orioles on this date.

No further observations were made at this spot until August 26. On August 11, Black Phoebes were observed at Baldwin Lake, and on August 12 both Bullock Orioles and Black-headed Grosbeaks were seen at Twin Peaks, in the San Bernardino Mountains.

August 26, 8:45-9:45 a. m.; at the fig tree observation point; no Bullock Orioles; five Black-headed Grosbeaks; one Black Phoebe; several Anna Hummingbirds. Arizona Hooded Orioles were still abundant, and several Western Tanagers (*Piranga ludoviciana*) were seen. In other years the Bullock Oriole has been seen at this spot as late as September 21.

September 2, 8:10-9:10 a. m.; figs still abundant; five Black-headed Grosbeaks; one Black Phoebe; two Anna Hummingbirds, one a singing male and the other a female; Arizona Hooded Orioles and Western Tanagers present.

September 9, 7:55-8:55 a. m.; one Black Phoebe; one Anna Hummingbird; Arizona Hooded Oriole and Western Tanager present. In other years Black-headed Grosbeaks have been seen here as late as September 20, and I have one record for October 16.

September 16, 8-9 a. m.; three Black Phoebes; three Anna Hummingbirds; Arizona Hooded Orioles still present.

September 23, 8-9 a. m.; one Black Phoebe; two Anna Hummingbirds. This was the last observation made.

To summarize the observations, Bullock Orioles and Black-headed Grosbeaks were present in considerable numbers during the midsummer period when others of their kind were in the mountains. But they left the lowlands at rather early dates, in spite of the still abundant local food supply. The figs often last well into October on these trees. The resident Black Phoebes remained quite constant in numbers during the period of observation, varying from one to three. The local pair had raised two broods of five young each earlier in the season. Grinnell observed that the early July birds seen moving up mountain were juveniles. The Anna Hummingbirds, not observed on July 1 and 8, were present in rather constant numbers on all the other dates; their food seemed to be mostly obtained from the red trumpet flowers.

The foregoing observations, supplemented by many more casual observations in other years, lead me to believe that the midsummer movements of such birds as the Bullock Oriole, Black-headed Grosbeak, Black Phoebe and Anna Hummingbird, in southern California, are in the nature of a postbreeding season dispersal, with local concentration where food is abundant, either in the coastal lowlands or in the mountains, rather than a definite migration into the mountains because of failing food supply in the lower regions.

Buena Park, California, April 27, 1933.

NOTES ON THE ANATOMY AND BREEDING HABITS OF CROSSBILLS

By THOMAS T. McCABE and ELINOR B. McCABE

The following rather unrelated facts, first in regard to the structure of the skull, and second in regard to certain peculiarities in the breeding habits in the crossbill, *Loxia curvirostra*, appear to have gone until now unnoticed or unappreciated.

Chapin (1917) has described a curious condition in three genera of Weaverbirds in which the foreparts of the frontal bones of the skull never assume the usual two-layered adult passerine character. He also mentions a similar condition in the African certhiid, *Salpornis salvadori*. A like condition exists in *Loxia curvirostra*, at least in the race *bendirei*.

We have under examination eleven flat skins of the race *bendirei* with complete skeletons and two ordinary study skins with the scalp removed—four completely red males, one yellow-orange male, five greenish-yellow females, one streaked male with heavy spotting of red and yellow but no molt in progress, and three streaked females with little or no postjuvenile color yet apparent.

Of the red males, one (no. 1086 T. T. and E. B. McCabe) has a considerable area of the anterior part of the frontals in which there is no evidence of two layers or of cleavage perceptible under a thirty-power binocular; two (nos. 1081 and 1082) have the layers, while closely adherent, separable with the aid of a fine-pointed blade and open enough to have admitted an infusion of blood; and one (no. 1089A) is open with columellae clearly visible, but the layers still much closer than in other adult passerine birds. The orange male is single and without perceptible cleavage. Of the five females, two (nos. 1070 and 1076) show no visible cleavage, one (no. 1080) has the layers close but separable, and infused with blood, and two (nos. 1085 and 1088A) show a wider, but not normally wide, interstice. The streaked male with heavy splashes of color shows cleavage but no interstice. It must be remembered that in these cases the single wall does not resemble the delicate roofing of an early juvenal skull. The bone is unusually dense and hard, opaque, and not flexible or papery.

The four juveniles represent stages from a papery transparency of the whole roof of the brain case to a similar condition restricted to small, transversely oval areas in the forepart of the frontal bones, corresponding to the hard single areas in the older skulls.

The single layer of the roof of the brain case seems to hold good as an age determinant for young birds, at least up to the middle of the postjuvenile molt, if we remember that thinness and transparency, not singleness, are the criteria. After that, the process of doubling seems to be irregular. The streaked male, with heavy color spots, which is not half way through the postjuvenile molt, shows more doubling than several of the pure red males and greenish-yellow females. Two supposedly fully adult birds, a male and a female, show maximum doubling.

A good deal of anatomical work has been done on the muscular dimorphism which follows the crossing of the mandibles and their peculiar use, notably by Hesse (1907), Duerst (1909), Stubbs (1909), Ticehurst (1910), Böker (1922) and others, without notice of the character under discussion, though Hesse opens a cogent line of speculation when he speaks of the bones of the bill as more than usually massive and less spongy, perhaps to meet the lateral pressure to which they are subjected.

It is an unexpected fact that examination of four skulls of *Loxia leucoptera* from specimens in adult plumages shows a normal, or nearly normal, degree of doubling.

To turn now to the principal subject of this paper, in 1864 Mr. H. W. Wheelwright, better known under the sobriquet "An Old Bushman," published a volume called "A Spring and Summer in Lapland." We have not had direct access to the book, but it is quoted by Ticehurst (1915) to the effect that *Loxia curvirostra* was found breeding in various plumages, including "the striped plumage of youth." To this, Ticehurst appends an emphatic footnote: "Surely an error.—C. B. T." In spite of the endlessness of European crossbill literature and recurring controversies over plumages, immature and adult, male and female, none of the controversialists have taken this suggestion seriously, though obscure hints of the same thing occur elsewhere, unconnected and unheeded. Wheelwright (1862), in spite of continued interest in crossbills, did not follow the matter up, but was misled into futile polemics in support of the finality of the orange-yellow plumage, a doctrine in regard to these and allied forms evidently shared by Linnaeus (1758, p. 171, "Junior ruber, Senior flavus" of "*Loxia enucleator*") and many others (cf. the Macpherson, 1889, and Howse controversy) and which probably had its origin, as it certainly did in the case of Wheelwright, in a natural misunderstanding of the well-known tendency of crossbills and other red fringillids to revert to an orange dress in captivity. Breeding in immature plumage was not mentioned again for almost thirty years, when Ussher (1890), describing Irish nestings in County Waterford, said of one breeding female, on March 20, "She is of a brownish grey, smaller than the male, and her beak less evidently crossed," and of another, on April 11, "She was of a brownish grey. I could see neither yellow nor green about her." This was not looseness of observation or vocabulary. Another breeding female is described as "an olive coloured bird with yellow rump."

The next rather unsatisfactory hint comes seventeen years later from Wyoming (*L. c. bendirei*), when Peabody (1907) wrote as follows: "On the 27th [of November] I was rewarded by finding what appeared to be a family of the past summer, still together. The adult male was still not an adult, if the reader will permit the contradiction. His plumage was still semi-juvenile. Yet he was in breeding condition, the testicles being of nearly maximum size."

In England, Walpole-Bond (1910b), writing of a nest seen on April 15 in Surrey, says "The cock at one nest was, however, of a dull brown, with only a tinge of red on the rump and breast", and again (1914), of a nesting in Sussex in April or May, "the male at one of the nests I found was a brown bird merely slashed with red on breast and rump."

Finally, at Indianpoint Lake in central British Columbia in the summer of 1931 we took two females (nos. 1055 and 1056) on August 19 and 20 with hard-shelled eggs in the lower oviducts, and two males (nos. 1046 and 1053) on August 3 and 13 with testes measuring 5 x 4.1 mm. and 5 x 3.8 mm., respectively, "in the striped plumage of youth" as described by Wheelwright in Lapland sixty-eight years previously. The two females have not replaced a juvenal feather. The two males are very sparsely flecked with yellow, and one has a feather or two of red. Not only is the plumage juvenal, but the anterior parts of the frontals in all four skulls are paper-thin, transparent, and flexible, though more so in the younger females. These birds were taken on north latitude 53° at an altitude of over 3000 feet in the cold interior of the Province.

not extra old man
very large!

Only two explanations, about equal in inherent improbability, can be suggested. First, complete juvenal plumages and skulls had persisted through the winter and

the ensuing breeding season. Second, the birds had bred the year they were born.

Two circumstances lend some semblance of probability to the first suggestion—the evidence that exists for very late fall breeding, which would require the young to undergo molt under conditions of great severity; and the sometimes puzzling course of the first fall change of plumage, which the following citations reflect. Molt appears to follow age rather than season, and the irregularity of breeding time, which makes it possible for young to be present in either dress or any combination of the two from early spring far into winter, adds to the confusion.

Brown (1883), who collected very large series in November, 1882, in Maine, found "specimens illustrating almost every known phase of plumage except that of nestlings. Of males there are highly-colored red birds, yellowish birds, greenish birds, and birds in a garb of mixed colors. In the cases of some of them traces of the first plumage unmistakably indicate immaturity, and these birds agree exactly with all of the others in an osteological condition which stamps the entire lot as young of the year. The vertex of the skull is incompletely ossified; it is easily indented by the edge of my thumb-nail; and it is *perfectly transparent* . . . According to my experience, resulting from the dissection of nearly four thousand specimens of North American birds, this is a condition which cannot exist in any Passerine species after maturity." The quotation has secondary interest in view of the common attribution of the "discovery" of this age character to Dwight (1900).

Collett (1881, cited by Ticehurst, 1915) speaking from wide experience in Scandinavia, says "traces of the striped juvenile plumage may yet be seen in February." He goes on to surmise that such birds may not reach sexual maturity by the normal breeding season, and so may provide the "abnormal summer and autumn breeding" which sometimes occurs.

Gloger (1861) after castigating various Scandinavian authors for maintaining unrighteous doctrines on the subject of crossbill plumage, translates Lilljeborg with approval as follows: ". . . wir an jungen Männchen . . . beobachtet haben, dass bei ihnen diejenige Tracht, welche auf das erste Jugendkleid folgt, gelblich mit röthlichem und grünlichem Anstriche ist, und zwar nach vollendet Mauser ziemlich dunkel." To which Gloger adds an explosive "Ja wohl! so, und nicht anders."

Finally Witherby (1920, p. 85) appears also to believe that a certain number of juvenal feathers may last through the year: "Frequently a varying number of striped juvenile-feathers remain, especially on breast and belly."

No one, however, has suggested the retention of complete juvenal plumage except Bechstein (1856) for captive birds. We have not had access to the original (1795-7) edition, or indeed to any of the older editions of his popular and long-lived "Naturgeschichte der Stubenvogel," but the English translation of 1856 (page 173), "with considerable additions" by H. C. Adams and incorporating the whole of Sweet's Warblers, says "It is curious that the young ones, which are bred in aviaries in Thuringia in great numbers, never acquire in confinement the red colour, but, in the second year either remain grey, or immediately receive the greenish yellow colour of the males who have twice moulted." (Bechstein shared the widespread belief in the maturity of the yellow male plumage.) None of this is repeated by Russ (1873) who may have found it untrue or apocryphal.

On the other hand the several authors who have examined large series and worked intensively on crossbill molt, such as Tschusi (1888), R. Schlegel (1914), Ticehurst (1915), Witherby (1915, pp. 173-175), and von Tischler (1917), do not mention incomplete first-fall molts nor suggest the possibility of the omission of such a molt. Ticehurst gives June 23 (completed) and November 30 (still in

progress) as the extreme dates for this molt known to him (presumably in England), and speaks of irregularity consequent upon variable breeding time, but thinks that completion in a manner "much the same as in other finches" is obvious.

Omitting the enormous literature of scattered notes of occurrence, especially relating to the great European "incursions," more or less extended series of observations have been reported, or large series collected and discussed by Tufts (1906) in Nova Scotia; Munro (1919) in British Columbia; Willett (1917 and 1921) in Alaska; Bunyard (1911, 1912, 1913, 1915), Gilroy (1910, 1922), Hale and Aldworth (1910), Riviere (1911, 1926, 1932), Stanford (1919), Tomlinson (1910), Tracy (1910, 1915, 1919, also cited by Riviere, 1926), and Walpole-Bond (1910 a and b, 1914) in England; Blasius, Müller, and Rohweder (1882), Klaas (1930), and Nolte (1930) in Germany; Munn (1921, 1930, also cited by Jourdain, 1927) in the Balearic Isles, and Prazák (1897) in Galicia. None of these mention irregularities of the first fall molt or breeding in juvenal plumage.

Only one circumstantial account (Silver, 1911) of crossbills bred in captivity, with information on plumage, has found its way into the literature, which states that by September 13 all the young had molted into yellow or red.

Within the scope of our own experience, twenty-four *L. curvirostra* (subsp.?) trapped at Indianpoint Lake in central British Columbia between December 1 and 6, 1927, were all in full bright-colored dress except one, which showed doubtful traces of juvenal feathers. Fifty-five others trapped at the same place between April 17 and June 11, 1929, were likewise all in full color. Of 107 streaked *bendirei*, trapped and carefully examined for molt at the same point between September 3 and October 7, 1931, ninety-one were molting into colored plumage. When this latter period is divided into equal fractions and the successive percentages of birds showing molt calculated, this percentage rises rapidly and would have reached 100 per cent by the first week of October had not a single newly-fledged bird appeared on October 7. The subsequent history of that bird, could it be ascertained, would be more important for our present purpose than all that was learned from the 1200 others banded during the summer and fall.

When a series of skins is studied the post-juvenal body molt of crossbills is puzzling, because streaked young can be found with dots and slashes of yellow or red, but showing, upon intensive examination, no molt in progress. It appears, however, that such a mixed plumage is not the result of true molt, but rather of casual losses, largely through preening. It is especially noticeable in this species because of the striking contrast in color between the juvenal and post-juvenal dress, and because the plumage is apt to be badly caked with pitch, which causes excessive preening, even to tearing out clusters of feathers, which are of course replaced in the color of the subsequent plumage. By carefully going over a series it is possible in most cases to separate such skins from older specimens in the course of true molt. True molt, once started, seems to us to be regular and continuous, and we believe that the late traces of streaked feathers so often referred to simply indicate late-hatched young. The sternal region of the ventral tract (central feather rows) and the pelvic region of the dorsal tract start simultaneously. The former works backward. The latter works forward, but not in regular sequence, for the forepart of the interscapular region takes up the molt rather before the waves from the rear reach it, and specimens with a hiatus of color in the middle of the back are common. Dwight (1900) indicates the same principal points of origin for the dorsal tract, but says that normally "the first place where new feathers show is at a spot in the interior interscapular region." Certainly in the crossbill skins at hand, new feathers in this tract

first appear over the pelvis. After these tracts are well advanced, the cervical regions (dorsal and ventral) begin and work forward to join scattered molt which has begun about the head. The last streaked feathers remain on the posterior termination and on the margins of the ventral tracts.

Finally, if, contrary to such evidence as we can assemble, not only incompleteness but occasional elimination of the first fall molt were proved and accepted in explanation of the records of the streaked breeding birds of Wheelwright, Ussher, Peabody, and Walpole-Bond, still our own "breeding juveniles" from Indianpoint Lake would not be accounted for. To believe that our four birds carried their juvenal dress for a year and bred in it is difficult. To believe as much for the condition of the skulls is impossible. That even in such a bundle of abnormalities as a crossbill the transparent and paper-thin condition may persist for the minimum of some ten months required if the birds had been hatched the previous October (an extreme date not likely to apply to all four) is the last hypothesis to which experience would warrant our turning. We are inclined, therefore, to accept the remaining alternative—that the birds were hatched the year they bred or very late the preceding calendar year.

For intelligent consideration of such a phenomenon we need definite knowledge of the breeding season. All breeding records available are presented here in tabular form, but, numerous as the records are, especially for the Old World, we feel, as will be explained below, that the summary as a whole is probably misleading, and the late summer and fall, especially in the New World, inadequately represented.

BREEDING RECORDS OF LOXIA CURVIROSTRA

	August	September	October	November	December	January	February	March	April	May	June	July	Totals			
England	1	..	1	4	9	42	14	57	34	20	..	189			
Ireland	1	6	..	2	1	..	14			
Scotland	1	..	..	3	..	3	..	1	9			
Central Europe	1	1	1	..	8	14	4	..	7	..	1	..	39			
N. Russia in Europe	6	..	1	..	..	7			
Belgium	1	..	..	..	..	..	..	1			
Norway	1	..	..	..	..	..	..	1			
Balearic Islands	2	..	..	..	1	4			
Algeria	1	..	..	..	..	..	..	1			
U. S. and Canada			
<i>minor</i>	3	3	2	6	..	4	..	20			
<i>bendirei</i>	1	..	..	5	..	..	..	6			
<i>stricklandi</i>	1	1	..	..	..	..	2			
<i>perca</i>	1	..	..	1			
Totals	1	2	1	2	18	30	53	17	92	34	32	2	10	1	4	294

The accompanying table of records is based on the time of laying the first egg, which is roughly computed from the recorded facts. Needless to say, numbers of records have been rejected on account of insufficient data for such treatment. Often, while the other data are satisfactory, it is impossible to say whether the first egg was laid late in one month or early in the next. For such cases an intervening column has been interpolated between the two months.

Records which depend only on the gathering of nest material, records of unfinished nests without later history, and of supposedly newly-hatched young being fed are excluded with one exception, a record of young *stricklandi* in Arizona when the recorder was William Brewster and the condition of the young very specifically stated. In one or two cases records of adults taken with eggs nearly ready to lay are included.

To construct or use such a table we need supplementary information on the breeding habits of the bird. For the rate and duration of the various portions of the breeding period we have several positive statements by Old World ornithologists. In all cases these are unsubstantiated, but seem to be based on unpublished material or obscure local records inaccessible to us, probably supported by age-long experience in lands where crossbills have been the favorites of tradition and folklore from time immemorial. Dalla-Torre and Tschusi (1885, p. 480, *fide* J. Demuth) say "Das Weibchen brütet die Eier allein in 14-16 Tagen aus." Evans (1891, p. 62) depending upon Naumann and Tiedemann gives 14-15 days incubation for *L. pityopsittacus* and 14 for *curvirostra*. Jourdain (note to Sowels, 1919) says the "period from the laying of the full clutch to the date of leaving the nest is thirty-two days." Heinroth (1922, p. 227) gives "Brutdauer" as 14 days, and Russ (1873) says "Brut 15 Tage."

No intensive observations of breeding, from beginning to end, have been published, but the following fragments of information roughly substantiate the statements just quoted.

As to the rate of building, Wilson (1932) recorded progress "from the foundation of the nest to the completion of the lining" in three days.

As to the interval between completion and the first egg, Wilson (*ibid.*) found one egg four days after the completion of the lining; Hale and Aldworth (1910) found three eggs seven days after the completion of the nest; Hancock (1861) three eggs five days after the birds had been watched building; Hunter (1908) found the female sitting on three eggs twelve days after the nest had been begun; Norman (1868) some final construction and four eggs in six days, and Wynne (1929) one egg six days after finding the nest "not quite finished."

For the rate of laying, over and above the data just mentioned, Walpole-Bond (1910) recorded the laying of two eggs in three days, Tutt (1910) five eggs in five days, and Munro (1919) two eggs in two days.

For incubation, Munro (*op. cit.*) found two young hatched and a third hatching twenty days after some stage of "building." Wynne (*op. cit.*) records forty-four days from a time when the nest was "not quite finished" to the departure of the young. If we allow one more day for completion this would agree precisely with Nolte (1930) who records forty-three days from a finished nest to the flight of the young. Nolte also records three new-hatched young twenty-three days after "building" was observed.

A strong tradition of double-brooding, that is, two broods in rapid succession, repeatedly crops up. It was categorically asserted for the genus by Bonaparte and Schlegel (1850), and has been vigorously advocated lately by Walpole-Bond and others, but without good evidence. Witherby (editorial note to Walpole-Bond, 1910) cites Yarrell, Jourdain, Dresser, and Seeböhm as favoring such a belief, and to these should be added Kirkman. Martin (1926) is reported to have evidence of regular breedings in January and April in Schleswig, but we have not had access to the original paper. Likewise Demuth (in Dalla-Torre and Tschusi, 1885) in Bohemia. There is one important observation which has been neglected, published by Tschusi and Dalla-Torre (1888) quoting Hanf and Paumgartner, in Austria, who watched a pair tearing down a nest (which had been used) in order to build another with the same material. A double breeding cycle, with early and late breeding periods many months apart, has also been suggested, but never, as far as we know, substantiated.

Munro (1919) gives the only record we have noticed of the abandonment of an unfinished nest. Apparently birds seen carrying nesting material may safely be set down as about to breed.

General statements which cannot be bound within the rigid limits of a tabulation are not to be neglected. Brehm (1924, p. 248) said that *curvirostra* had been recorded with eggs or young from every month of the year, and that he had himself seen birds in full molt feeding young, laying, and pairing. Prazák (1897) said that his collection contained nests and clutches from eastern Galicia taken in March, May, June, August, September, and October. Stanford (1919) said that he had heard crossbills singing in Suffolk every month of the year except July and November. Tufts (1906) tells of finding new hatched young in Nova Scotia on January 31 and adds: "During the following months, many other nests were found", and "The birds have been nesting ever since" (that is, up to May 7); and "Some years ago a nest of the American Crossbill was found on August 4 containing newly hatched young." Witherby (footnote to Noble, 1910) and Hagen (1930) say that eggs have been found in Denmark every month from January to May. We quote at length two statements by Willett (1917 and 1921) for southeastern Alaska, which suggest very prevalent late summer and early fall breeding in the race *sitkensis*, as well as rather continuous breeding by some part of the population through two-thirds of the year.

. . . Birds shot by Mr. W. D. McLeod at Howkan in early September, 1916, showed from the condition of their reproductive organs that they would have bred in about two or three weeks. I had noted a similar condition in two specimens taken at Sitka in September, 1913, but had supposed them to be exceptional cases. . . . This seems the more extraordinary when we consider that at this time the bad weather has generally commenced and that it must be well along into early winter before the young leave the nest.

In late August, 1919, vicinity of Craig, birds were paired and males singing. Fully fledged young were plentiful in late September and early October. Again in late March and early April, 1920, many birds were paired and evidently nesting. A pair of breeding birds was taken April 1 and another pair, also breeding birds, April 2. On April 27 a pair of adults were seen feeding full-grown young on the ground.

Dalla-Torre and Tschusi (1885) quote an account by Ratoliska of coition observed in Braunau (Bohemia) at -12.5° C.

The north offers other examples of very early breeding, witness the Prairie Horned Lark, the Horned Owl and the Canada Jay, though none quite so early as the crossbill. It is cogent to ask why, if crossbills born the previous late winter or early spring can breed from the beginning of August on, should not some of the other forms just mentioned breed in the later summer or fall? Here Riddle's (1931) investigation of the season of origin as a determiner of the age at which birds become sexually mature is of pertinent interest. Riddle, working with many races of pigeons and ring-doves in captivity found a difference of fifty-two per cent between the ages at maturity of birds born in November, December, and January, and others born in March, April, and May, and correlates this difference with the periods of increase and decline of the thyroid, elsewhere shown to act inversely with the increase and decline of the gonads and in response to changes of temperature. On the basis of such a program the importance of delay in time of birth after midwinter would be greatly enhanced. An ever-increasing fraction of the favorable season, with declining thyroid, would be lost, and an ever-increasing share of the unfavorable season, with mounting thyroid activity, would be included in the period of maturation.

The determination of minimum age at maturity (4 months) for Riddle's ten races of doves and pigeons is a substantial fact. Birds of this group mature rapidly for their size, for figures for incubation and brooding are in some cases rather smaller than those just given for crossbills. H. A. Carr, editing Whitman (1919) gives incubation periods for pigeons and doves varying from $12\frac{1}{2}$ to 19 days for different

races, with variations of as much as two days within a race, and adds, evidently for all forms, that the young leave the nest about two weeks after hatching. Seen in the light of our limited knowledge of potential age at maturity in passerine cage birds, the minimum age of 4 months seems rather great.

The annals of aviculture should be a mine of information on the subject, but it is almost impossible to find accurately detailed and dated facts, while the technique is designed to prevent breeding outside the humanly appointed "season." We have, however, found several items in A. G. Butler (1899) which show that sexual maturity may be reached by small passerine birds in a far shorter time than four months. Thus (page 109) of the Zebra Waxbill, *Sporaeeginthus subflavus*, in captivity, Butler says "after eight weeks [from hatching] the yellow becomes deep and shining. . . . Then the bird is fit to propagate its kind." Of the Amaduvade Waxbill, *S. amandava*, "After eight weeks, or thereabouts, the beak is red, and then the Tiger-fin (German trivial name) is fit to go to nest." The Common African Waxbill *Estrilda cinerea*, was also said by Butler to be capable of being bred from the fifth to the eighth week. A record of the Ribbon Finch, *Amadina fasciata*, is cited (page 185), of which two males and two females left the nest in the "second week of September", while both females began to lay on October 12. Of this form Butler adds categorically: "Young female already capable of nesting after two or three months." Of Zebra finches, *Taeniopygia castanotis*, he says that the young are like their parents and ready to breed eight weeks after leaving the nest.

These species are all from warm climates, and the achievement of maturity may, like reproductive frequency, be more rapid in tropical birds. But there seems to be no reason to think it physiologically impossible for crossbills born between January and April to breed by August, nor for a bird born in the late fall to breed in March, as recorded by Ussher, except that other northern forms are not known to do so.

Environmental factors that have been proposed as actuating the annual cycle of gonad changes are increasing or decreasing hours of light, working through the amount of physical activity (Rowan, 1926, 1929), and change both in quantity and constitution (wave lengths) of light (Bissonnette, 1932, and papers by others), perhaps operating through an endocrine mechanism. Crossbills have unquestionably bred in many months while the hours of daylight were decreasing, and do so habitually while both amount of light and red-ray content are at a very low ebb.

It is natural to look for other characteristics of the group which may have developed by selection and adaptation, along with such breeding habits, or which, coming into being as the result of unknown vital forces, have made the habits possible or necessary. First, is the peculiar bill, and its high efficiency for opening cones, though in passing we note that its equally high efficiency for other less habitual purposes has drawn emphatic comment (Taverner, 1922). Second, the crossbill is one of the rather rare forms which is potentially independent of insect food in the breeding period. It is true that the American races, at least, are far from being exclusively graminivorous. In reality they have been shown at certain times and seasons to be predominantly insectivorous (Henderson, 1927, and others), a fact not reflected in Old-World literature. None the less the stomachs and crops of the birds which were brooding or rearing young in central British Columbia in March, 1931, contained only coniferous seeds, and the ability, on such a diet, to feed the young by regurgitation seems unquestionable. This ability must be called into play in most cases of winter breeding in the north. Third, the habit, long familiar in tradition and fairly well substantiated by scattered modern observations, of *continuous brooding* (the

female is generally supposed never to leave the nest) may be a response to the problem of low temperatures. American spruces and firs ripen and shed their seed in the fall, and it is hardly possible that the seeds are better or more available in late winter or early spring. None of the characteristics mentioned is unique or likely to make the peculiar breeding period necessary or advantageous.

In other words if we ask why a bird of deep-seated boreal affiliations should thus resist the forces which have reduced the sexual cycle of most of the temperate bird world to some approach to a basic pattern, no answer is apt to be forthcoming from the philosophy of selection and adaptation. Spread in relatively small numbers over a gigantic and uniform circumpolar range of almost uninterrupted conifers, possessing the power, rare in the north but perhaps more common in the tropics, to wander gypsy-like in search of favorable pasture, under as little competitive pressure for food or nesting sites or materials as any northern passerine bird—what process can be suggested to force such an organism into so eccentric a habit, and permit it to realize, in the face of evident obstacles and disadvantages, physiological potentialities elsewhere revealed only under artificial or tropical conditions? It is hard to escape the suggestion that the whole reproductive cycle is more a genetically, less an environmentally, controlled phenomenon.

We are indebted to the kindness of Dr. Jean M. Linsdale for many references used in this paper.

LITERATURE CITED

Bechstein, J. M.
 1856. Cage and chamber-birds, their natural history, habits, food, diseases, management, and modes of capture, translated, with considerable additions, etc., by H. G. Adams, incorporating the whole of Sweet's British Warblers, with numerous illustrations. (London), pp. xvi + 500.

Bissonnette, T. H.
 1932. Possible relation of age at sexual maturity in birds to daily period, intensity, and wave-length of light. *Science*, 75: 18-19.

Blasius, R., Müller, A., and Rohweder, J.
 1882. V. Jahresbericht (1880) des Ausschusses für Beobachtungsstationen der Vögel Deutschlands. *Journ. für Ornith.*, 30: 18-110.

Böker, H.
 1922. Die Bedeutung der Überkreuzung der Schnabelspitzen bei der Gattung *Loxia*. *Biologisches Centralblatt*, 42: 87-93.

Bonaparte, C. L., and Schlegel, H.
 1850. Monographie des Loxiens (Leyden and Düsseldorf), pp. xvii + 55, 54 colored plates.

Brehm, A. E.
 1924. Brehms Tierleben, Edited C. W. Neumann (Leipzig), vol. 4: 1-724.

Brown, N. C.
 1883. Immaturity vs. individual variation. *Bull. Nuttall Orn. Club*, 8: 46-48.

Bunyard, P. F.
 1911. Crossbills breeding in England in 1911. *British Birds*, 4: 363-364.
 1912. Crossbills breeding in Suffolk for the third year in succession. *British Birds*, 6: 88-89.
 1913. Crossbills breeding in Suffolk for the fourth year in succession. *British Birds*, 7: 81.
 1915. Crossbills breeding in Suffolk. *British Birds*, 9: 153-154.

Butler, A. G.
 1899. Foreign finches in captivity. Ed. 2 (Hull and London, Brumby and Clarke, Ltd.), pp. viii + 294.

Chapin, J. P.
 1917. The classification of the weaver-birds. *Bull. Amer. Mus. Nat. Hist.*, 37: 243-280, 9 figs. in text, pls. 6-10, 1 diagram.

Collett, R.
1881-92. Mindre Medd. vedr. Nörges Fuglef., pp. 76-78 [fide Ticehurst, 1915].

Dalla-Torre, K., and Tschusi, Ritter von, zu S.
1885. II. Jahresbericht (1883) des Comité's für ornithologische Beobachtungsstationen in Oesterreich und Ungarn. *Ornis*, 1: 197-576.

Duerst, U.
1909. Pathologische Differenzierung als gattungs-, art-, und rassenbildender Faktor. I. Mechanische, anatomische, und experimentelle Studien über die Morphologie des Schädels von Angehörigen der Gattung *Loxia*. Mitteilungen der Naturforschenden Gesellschaft in Bern aus dem Jahre 1909, pp. 281-303.

Dwight, J.
1900. The sequence of plumages and moults of the passerine birds of New York. *Annals New York Acad. Sci.*, 13: 73-360.

Evans, W.
1891. On the periods occupied by birds in the incubation of their eggs. *Ibis*, ser. 6, 3: 52-93.

Gloger, C. L.
1861. Richtige Ansicht eines nordischen Zoologen über die Färbung der männlichen Kreuzschnäbel. *Journ. für Ornith.*, 9: 78.

Gilroy, N.
1910. In "Crossbills nesting in England." [Composite authorship.] *British Birds*, 3: 371-372.

1922. Observations on the common crossbill (*Loxia c. curvirostra*). *Oologists Record*, 2: 76-80.

Hagen, W.
1930. Der Fichtenkreuzschnabel als Brutvogel der Nordmark. *Ornith. Monatsberichte*, 38: 88-89.

Hale, J. R., and Aldworth, T. P.
1910. Crossbills nesting in England. *British Birds*, 4: 212-213.

Hancock, J.
1861. Nesting of the crossbill (*Loxia curvirostra*) in the county of Durham. *Zoologist*, p. 7383.

Heinroth, O.
1922. Die Beziehungen zwischen Vogelgewicht, Eigengewicht, Gelegegewicht und Bruttage. *Journ. für Ornith.*, 70: 172-285.

Henderson, J.
1927. The practical value of birds (New York, Macmillan), xii + 342 pp.

Hesse, Dr. E.
1907. Über den inneren knöchernen Bau des Vogelschnabels. *Journ. für Ornith.*, 55: 185-248.

Hunter, R. H.
1908. Breeding of the crossbill in County Dublin. *British Birds*, 2: 203-204.

Jourdain, F. C. R.
1927. Die Eier der Vögel von Mallorca (Balearen). Beiträge zur Fortpflanzungsbiologie der Vögel, 3: 33-37 (Part I).

Klaas, K.
1930. *Loxia curvirostra* L.—Invasion im Taunus. Beiträge zur Fortpflanzungsbiologie der Vögel, 6: 172.

Linnaeus, C.
1758. *Systema naturae per regna tria naturae*, etc. Ed. 10 (Stockholm), vol. 1, pp. 1-824.

Macpherson, H. A.
1889. Crossbill breeding in immature plumage. *Zoologist*, ser. 3, 13: 229.

Martin, G.
1926. Die Vögel des Kreises Hirschberg in Schlesien. Berichte des Vereins Schlesisch. Ornitholog., 12: 61-63.

Munn, P. W.
1921. Notes on the birds of Alcudia, Majorca. *Ibis*, ser. 11, 3: 672-719.
1930. Further notes on the birds of the Balearic Islands. *Ibis*, ser. 12, 6: 123-128.

Munro, J. A.
 1919. Notes on the breeding habits of the red crossbill in the Okanagan Valley, British Columbia. *Condor*, 21: 57-60.

Noble, H.
 1910. Crossbills nesting in Norfolk. *British Birds*, 3: 302.

Nolte, W.
 1930. Brut des Fichtenkreuzschnabels in Schleswig-Holstein nebst biologischen Bemerkungen. *Journ. für Ornith.*, 78: 1-19.

Norman, G.
 1868. Nesting of the crossbill. *Zoologist*, p. 1255.

Peabody, P. B.
 1907. The crossbills of northeastern Wyoming. *Auk*, 24: 271-278.

Prazák, J. P.
 1897. Materialien zu einer *Ornis Ost-Galiziens*. *Journ. für Ornith.*, 45: 365-479.

Riddle, O.
 1931. Studies on the physiology of reproduction in birds. XXIX. Season of origin as a determiner of age at which birds become sexually mature. *Amer. Journ. Physiol.*, 97: 581-587.

Riddle, O., and Fisher, W. S.
 1925. Seasonal variation of thyroid size in pigeons. *Amer. Journ. Physiol.*, 72: 464-487.

Riddle, O., and Polhemus, I.
 1931. Studies on the physiology of reproduction in birds. XXXI. Effects of anterior pituitary hormones on gonads and other organ weights in the pigeon. *Amer. Journ. Physiol.*, 98: 121-130.

Riviere, B. B.
 1911. Crossbills breeding in England in 1911. *British Birds*, 4: 364-365.
 1926. Ornithological report from Norfolk for 1925. *British Birds*, 19: 238-246.
 1932. Ornithological report for Norfolk for 1931. *British Birds*, 25: 342-354.

Rowan, W.
 1926. On photoperiodism, reproductive periodicity, and the annual migrations of birds and certain fishes. *Proc. Boston Soc. Nat. Hist.*, 38: 147-189.
 1929. Experiments in bird migration. I. Manipulation of the reproductive cycle: seasonal histological changes in the gonads. *Proc. Boston Soc. Nat. Hist.*, 39: 151-208.

Russ, K.
 1873. Handbuch für Vogelliebhaber, -Züchter, und -Händler. Vol. 2, Einheimische Stubenvögel (Hannover), xxvi + 463.

Schlegel, R.
 1914. Ornithologische Ergebnisse eines fünfwochigen aufenthaltes im Rachelgebiete (Bayrischer Wald). *Journ. für Ornith.*, 62: 252-259.

Silver, A.
 1911. Notes on the breeding of the crossbill. *Avicultural Magazine*, ser. 3, 2: 109-114.

Sowels, M. A.
 1919. Early nesting of the crossbill in West Norfolk. *British Birds*, 12: 208. [With note by F. C. R. Jourdain.]

Stanford, J. K.
 1919. Ornithological notes from Suffolk. *British Birds*, 13: 170-172.

Stubbs, F. J.
 1909. Dimorphism in the crossbill. *British Birds*, 3: 194-195.

Taverner, P. A.
 1922. Crossbills eating aphid. *Condor*, 24: 96.

Ticehurst, C. B.
 1910. Dimorphism in the crossbill. *British Birds*, 3: 261-262.
 1915. On the plumages of the male crossbill (*Loxia curvirostra*). *Ibis*, ser. 10, 3: 662-669.

Tischler, F. von
 1917. Die Kleider des Fichtenkreuzschnabels (*Loxia curvirostra*). *Journ. für Ornith.*, 65, Zweiter Band: 261-269.

Tomlinson, A. S.
1910. Crossbills nesting in England. *British Birds*, 4: 20.

Tracy, N.
1910. *Crossbills nesting in England*. *British Birds*, 4: 22.
1915. *Crossbills breeding in Norfolk*. *British Birds*, 8: 289-291.
1919. Crossbills nesting in Norfolk. *British Birds*, 12: 277-278.

Tschusi, Ritter von, zu S.
1888. Zum heurigen Erscheinen des Fichtenkreuzschnabels. *Ornith. Monats-*
schrift, 13: 368.

Tschusi, Ritter von, zu S., and Dalla-Torre, K.
1888. IV. Jahresbericht (1885) des Comité's für ornithologische Beobachtungs-
Stationen in Oesterreich-Ungarn. *Ornis*, 4: 1-146, 161-272, 321-368.

Tufts, H. F.
1906. Nesting of crossbills in Nova Scotia. *Auk*, 23: 339-340.

Tutt, H. R.
1910. In "Crossbills nesting" [composite authorship]. *British Birds*, 4: 81-82.

Ussher, R. J.
1890. Nesting of the crossbill in the Co. Waterford. *Zoologist*, pp. 199-204.

Walpole-Bond, J.
1910a. In "Crossbills nesting in England" [composite authorship]. *British Birds*, 4: 47-51.
1910b. In "Crossbills nesting in England" [composite authorship]. *British Birds*, 3: 406-408.
1914. Field-studies of some rarer British birds (London, Witherby), ix +
305 pp.

Wheelwright, H. W.
1862. On the change of plumage in the crossbills and pine grosbeak. *Zoologist*,
pp. 8001-8002.
1864. A spring and summer in Lapland. [*fide* Ticehurst 1915; a 2nd ed., with
colored plates, was published in London in 1871.]

Whitman, C. O.
1919. The behavior of pigeons. Edited by H. A. Carr, with a preface by Oscar
Riddle, vol. 3 of the Posthumous Works of Charles Otis Whitman.
(Washington, Carnegie Inst.), pp. xi + 161.

Willett, G.
1917. Further notes on the birds of Forrester Island, Alaska. *Condor*, 19: 15-17.
1921. Bird notes from southeastern Alaska. *Condor*, 23: 156-159.

Wilson, A. T.
1932. Crossbill breeding in Breconshire. *British Birds*, 26: 22.

Witherby, H. F.
1915. The moults of the British Passeres, with notes on the sequence of their
plumages. Pt. II. *British Birds*, 9: 167-176.
1920. A practical handbook of British birds. (London), vol. I, xvi + 532 pp.

Wynne, O.
1929. Common crossbills breeding in Devon. *British Birds*, 22: 188.

Museum of Vertebrate Zoology, Berkeley, California, January 21, 1933.

FRIGATE-BIRDS OF THE WEST AMERICAN COAST

WITH ONE ILLUSTRATION

By H. S. SWARTH

Study of the series of *Fregata* in the collection of the California Academy of Sciences and in that of the Museum of Vertebrate Zoology, undertaken in order to ascertain the nature and extent of variation obtaining in the two species occurring on the Galapagos Islands, has elicited some facts worthy of record. It seems curious that for so many years the several species of the extremely conspicuous Frigate-birds were misunderstood, all going under the name of *Fregata aquila*. Probably, however, there are not many localities where two species occur together, and in such places specific differences were obscured in the medley of plumages produced by the many young birds in various transitional stages toward the different adult plumages of the two sexes. In 1897 Ridgway (Proc. U. S. Nat. Mus., XIX, 1896 [1897], pp. 590-592) recognized two species in the Galapagos series before him, but his findings were ignored by others who collected later in the islands. It remained for the studies of Mathews (Austral Avian Record, II, 1914, pp. 117-121), Rothschild (Novit. Zool., XXII, 1915, pp. 145-146), and finally Lowe (Novit. Zool., XXXI, 1924, pp. 299-313), to give us a proper conception of the facts in the case.

The Galapagos Islands and the west coast of Mexico form a meeting ground for two species. *Magnificens*, primarily of the West Indian region and the tropical Atlantic coast of South America, extends westward to the west coast of Mexico and to the Galapagos; *minor*, primarily of the tropical Indian and Pacific oceans, reaches (in the subspecies *ridgwayi*) an eastern boundary on the Galapagos and on the west coast of Mexico.

Fregata magnificens was described (Mathews, *op. cit.*, p. 120) from the Galapagos Islands, and in the subspecific sense the name probably should be restricted to birds of that region. In this connection certain comments by Lowe (*op. cit.*, p. 304) voice my own attitude exactly. Speaking of a series of specimens from scattered points within the general range of the species, he says: "From the point of view of distribution or the study of genetics they are, for me, *F. magnificens*, but I should be quite prepared to believe that if large series were carefully measured and compared with typical examples from the Galapagos, differences might be found and subspecies established. It goes without saying that an isolated colony in say the Bahamas will not breed true to the same index figure as one in the Dutch West Indies or another in the Galapagos."

Specimens and measurements in sufficient number to demonstrate the whole situation are not to be had, but such evidence as exists tends to show the local restriction of even these birds, powerful fliers as they are. A series from Lower California (in the Museum of Vertebrate Zoology) differs appreciably in measurements from the Galapagos birds, illustrating the different "index figure" to which Lowe alludes. *Rothschildi*, from Aruba, West Indies, was described by Mathews (Birds of Australia, IV, 1915, p. 280) as differing from *magnificens* "in its smaller size, conspicuously shorter tail, and different coloration of the breeding plumes and also of the wing coverts." (This, incidentally, is the only statement I have seen implying a seasonal change of plumage in *Fregata*.) Rothschild (*in Lowe, Novit. Zool.*, XXXI, 1924, p. 313) asserts that the differences between the West Indian *rothschildi* and the Galapagos *magnificens* "are solely in the length of the tail; those of the West Indian birds and the few we have from the east coast of South America consistently show much shorter tails than the Galapagos birds."

Measurements of Frigate-birds at the best are unsatisfactory. The wings in a prepared skin are difficult to measure accurately, and wings and tail both are apt to include badly worn or broken feathers, or there may be missing feathers or partly grown ones to an unsuspected degree. The bill is so shaped that different people would be unlikely to take the culmen measurement in exactly the same way; the dwarfed tarsus is practically unmeasurable; and the toes in a prepared specimen are apt to be twisted so as to be of little value for comparisons. Making all due allowance though, the Lower California birds are smaller than the Galapagos ones. As regards color I am not so sure. *Magnificens* is described as having in the adult male a predominating purplish sheen above, as compared with the greenish sheen of *minor*. This difference is clearly evident in our Galapagos series of the two species, but in the Lower California *magnificens* the purplish sheen is far less apparent. However, the entire series from Lower California is composed of birds that were salted in the field, then, months later, relaxed, washed and reshaped in the museum; and I am not sure to what extent, if any, an iridescent color might be affected by this treatment. A single male at hand from Florida is colored like the Galapagos birds.

My conclusions are that the Galapagos colony of *Fregata magnificens* is isolated and apart from the Mexican west coast population. Differences exist between the two, slight in degree but consistent enough in mode of occurrence to justify restriction of the name *F. m. magnificens* to the Galapagos bird. The Mexican west coast bird, so far as I can now see, shows the described characters of *F. m. rothschildi*, and should bear that name.

Local distribution of the two species, *F. magnificens* and *F. minor ridgwayi*, is of interest. On the Galapagos they are apparently apart in their breeding activities. The two large nesting colonies of which I have detailed information were each composed solely of *ridgwayi*. I have no exact data on breeding *magnificens* that was recognized as such. I do not recall any reliable published statement of the occurrence of a form of *Fregata minor* on the coast of Mexico, but specimens and data at hand indicate the occupation of San Benedicto, Revillagigedo Islands, by that species. The collection of the California Academy of Sciences contains one adult and two near adult males and one immature taken from a breeding colony on San Benedicto, and two immatures from Clarion. A photograph published by Bent in his "Life Histories" (U. S. Nat. Mus. Bull. 121, 1922, pl. 67) of a breeding colony of Frigate-

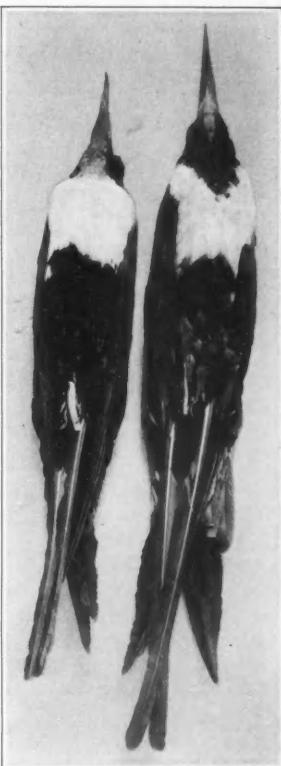


Fig. 28. ADULT FEMALES OF *Fregata minor ridgwayi* (LEFT) AND *F. magnificens magnificens* (RIGHT). THE GRAY THROAT OF ONE AND THE BLACK THROAT OF THE OTHER ARE FEATURES THAT ARE READILY SEEN IN THE LIVING BIRD.

birds on San Benedicto is clearly of *Fregata minor*; unpublished photographs in the possession of the Academy taken upon the Revillagigedo Islands, are, where the species is recognizable, all of *minor*.

Comparison of our small series from the Mexican islands with those from the Galapagos shows no differences that I can recognize, and I am calling them all *Fregata minor ridgwayi*. This is on the assumption, which I have no means of testing, that *ridgwayi* is a distinguishable form of *Fregata minor*.

In the collection of the Museum of Vertebrate Zoology there are Frigate-birds from the following points in Lower California: Santa Margarita Island (June), 17 miles south of Todos Santos (October), La Paz (May, July); and also from Isabela Island, Nayarit, Mexico (May). These are all *Fregata magnificens rothschildi*. The specimens from Isabela Island were collected in 1929; in the California Academy of Sciences collection of photographs there is one taken on Isabela Island in 1925, showing a female Frigate-bird on the nest, clearly of the species *magnificens*. In an article entitled "A rookery of man-o'-war birds" by Walter E. Bryant (Nidiologist, I, 1893, pp. 1-3), describing the colony on Santa Margarita Island, a female pictured on the nest is also recognizable as *magnificens*. It is hard to avoid ambiguity in such statements as the foregoing, but of course it is assumed that Lower California birds are all of the subspecies *rothschildi*. Photographs, however, show only the specific characters contrasting the two species, *magnificens* and *minor*, and are alluded to in such terms.

I am publishing these notes largely for the purpose of urging upon others, and enabling them, to specifically identify the Frigate-birds of any west coast colony they may visit. Various ornithologists have visited the Mexican coast and islands of recent years and presumably others will follow, and it is important that such opportunities be improved to increase our knowledge of these birds. There must be a number of Frigate-birds' eggs in collections labelled "*Fregata aquila*," the specific identity of which can never be learned. The two west coast species are fairly easily distinguished in flight, easily recognized upon their nests. The accompanying "key" will serve to indicate their outstanding differences.

I wish to express here my appreciation of the privilege I have received of studying the Lower California series of *Fregata* in the Museum of Vertebrate Zoology, a series that has not otherwise been published upon. I am grateful as well to Mr. Joseph Mailliard for the photograph that is reproduced herewith.

Fregata magnificens magnificens
and *F. m. rothschildi*

Fregata minor ridgwayi

Adult male

Iridescence on back prevailingly purplish; outer surface of wing uniformly dark (no rusty bar on coverts).

Adult female

Head and neck black all around; black of neck extending downward in a point on center of breast.

Immature

Entire head, neck and lower parts white; no tinge of rufous.

Top and sides of head blackish; throat pale gray almost white, continuous with white breast.

California Academy of Sciences, San Francisco, March 22, 1933.

**THE SPAN OF THE NESTING SEASON OF BIRDS IN BUTTE
COUNTY, CALIFORNIA, IN RELATION TO
THEIR FOOD**

WITH ONE ILLUSTRATION

By WILLIAM B. DAVIS

During the years 1928 to 1930, the writer was actively engaged in collecting birds' eggs in the vicinity of Oroville, Butte County, California. Trips were made afied each week end, and on occasional afternoons during the week, from the first of February to the first week in June, for the sole purpose of locating nests with fresh eggs. The period each year from June 10 to September 1 was not spent in this locality, though occasional trips were made to this area during that period.

The section under consideration is situated at the eastern edge of the Sacramento Valley near the mouth of the Feather River Cañon; it includes also a small territory, ten miles to the northwest on the Oroville-Chico Highway, known as Dry Creek. Both the Upper Sonoran and the Lower Sonoran life-zones are represented, the former in the foothills to the east and the latter in the low semi-arid waste lands to the west. A small portion of the area, in which collecting and observing were done, is under cultivation, oranges and olives being the chief crop, but by far the larger part consisted of the willow-cottonwood habitat at Dry Creek, the ceanothus—digger pine—blue oak habitat in the foothills, the numerous valley oak habitats, the large areas of rolling, grassy terrain, and the cottonwood-sycamore habitat lining each bank of the Feather River.

The purpose of this study was twofold: (1) to show the range of season of the nesting activities of birds in this locality; and (2) to see if there is any correlation between the nesting season and the type of food generally consumed. To accomplish the latter the birds have been segregated into four groups. Only records of sets actually taken with fresh or slightly incubated eggs, and of sets inspected that were known to be in a similar condition, are included in this study. Thus, several species found in this area during their nesting season, but whose nests were never located, are excluded.

FLESH-EATING BIRDS

	No. of nests	First date	Last date	Average date
California Great Blue Heron....	31	February 17	March 24	March 12
Anthony Green Heron.....	1	May 6	.....	.....
Turkey Vulture.....	1	April 17	.....	.....
Cooper Hawk.....	4	April 8	April 30	April 15
Western Red-tail.....	2	March 31	April 16	.....
Barn Owl.....	7	March 25	April 20	April 9
California Screech Owl.....	7	March 8	May 9	April 15
Pacific Horned Owl.....	3	February 8	March 1	Feb. 18
Western Belted Kingfisher.....	1	May 31	.....	.....

OMNIVOROUS BIRDS

Desert Sparrow Hawk.....	10	March 31	May 9	April 18
Road-runner	1	April 6	.....	.....
California Jay.....	5	March 31	April 26	April 15
Yellow-billed Magpie.....	31	March 31	May 9	April 15
Western Crow.....	25	April 9	May 3	April 24
California Shrike.....	2	April 6	April 15	.....
Bicolored Red-wing.....	10	April 20	May 6	April 28
Tricolored Red-wing.....	10	May 1	May 9	May 6
Brewer Blackbird.....	6	April 16	May 3	April 20
Nevada Cowbird.....	7	April 28	June 6	May 6

INSECT-EATING BIRDS

	No. of nests	First date	Last date	Average date
Killdeer	4	March 3	May 6	April 16
Red-shafted Flicker	4	April 15	May 16	May 1
California Woodpecker	13	March 31	May 28	April 20
Nuttall Woodpecker	4	April 20	May 12	April 28
Arkansas Kingbird	6	May 9	May 24	May 15
Ash-throated Flycatcher	2	May 8	May 25	.....
Black Phoebe	9	April 1	May 1	April 10
Tree Swallow	2	May 28	June 3	.....
Bank Swallow	1	May 31	.....	.....
Barn Swallow	12	April 24	April 30	April 30
Northern Cliff Swallow	3	April 12	May 9	May 1
Plain Titmouse	10	March 30	May 12	April 8
Slender-billed Nuthatch	3	March 28	April 3	April 1
San Joaquin Bewick Wren	1	April 20	.....	.....
Western Robin	1	April 22	.....	.....
Western Bluebird	4	April 28	May 3	May 1
Western Gnatcatcher	6	April 28	May 21	May 6
California Bush-tit	15	April 1	May 1	April 12
California Yellow Warbler	2	May 30	June 6	.....
Western Meadowlark	9	March 30	May 12	April 18
Bullock Oriole	2	May 6	.....	.....
Black-headed Grosbeak	3	May 1	May 31	May 15

VEGETABLE AND SEED-EATING BIRDS

Common Mallard	1	May 1	.....	.....
Wood Duck	1	April 30	.....	.....
Valley Quail	2	May 18	May 24	.....
Western Mourning Dove	2	May 21	May 22	.....
House Finch	9	April 16	May 9	April 28
Willow Goldfinch	10	April 28	June 16	May 6
Sacramento Spotted Towhee	1	May 1	.....	.....
Sacramento Brown Towhee	9	April 20	May 20	May 1
Western Lark Sparrow	15	April 24	May 21	May 1
Modesto Song Sparrow	1	May 1	.....	.....

The tabulations given above for the Nevada Cowbird are of eggs found in nests of other species: 5 in nests of Western Gnatcatcher; 1 in nest of Western Lark Sparrow, and 1 in nest of Bicolored Red-wing.

In all, 333 nests with fresh eggs were found, grouped as follows: Flesh-eaters, 57; omnivorous feeders, 107; insectivorous feeders, 118; vegetable- and seed-eaters, 51.

The nesting seasons of these four groups follow each other in the above order with the flesh-eaters showing the greatest span of period, from February 8 to May 31. (See fig. 29.) The omnivorous and insectivorous groups began active nesting after March 15, with the latter extending its period to June 6. It is of interest to note that the vegetable- and seed-eaters did not begin egg laying until the other groups had reached the composite peak of the season.

No doubt this sequence of the nesting seasons of the groups is, as a whole, dependent to a large extent not only upon climatic conditions, but upon the abundance of available food with which to rear the young. The climate in this region is such that approximately 89 per cent of the total precipitation of 28.33 inches (annual mean) falls during the months of November, December, January, February and March, which, plus a rather high mean temperature early in the calendar year (54.3° F. for March), insures an early growth of vegetation. Due to the high tempera-

tures of the summer months (80.2° F. for July) and the sparsity of rainfall (0.03 inches for July), the herbage is dead and seared from the middle of May to November, except in proximity of streams and irrigated regions. This combination of fac-

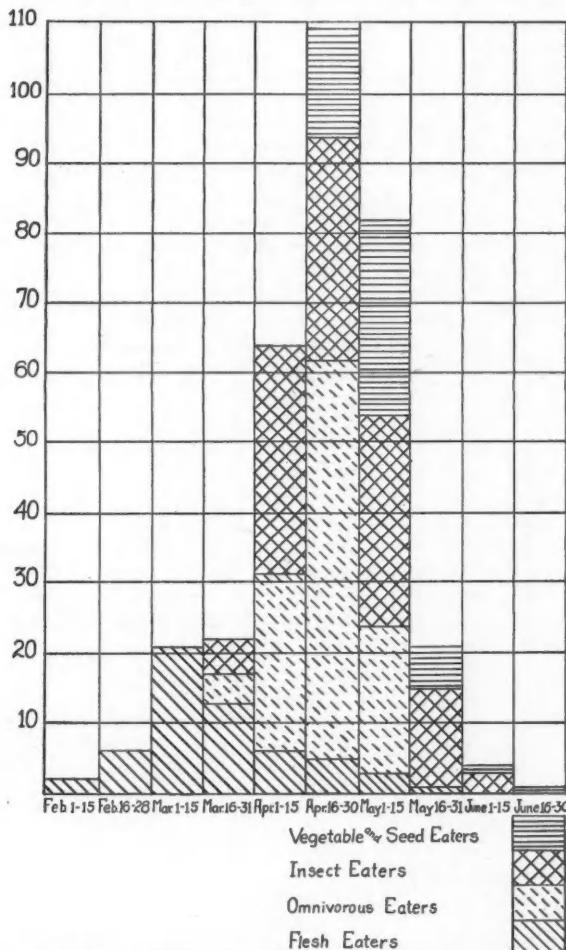


Fig. 29. COMPILATION OF THE NUMBER OF SETS OF FRESH EGGS OF BIRDS TAKEN OR OBSERVED DURING EACH TWO WEEKS PERIOD FROM FEBRUARY 1 TO JUNE 30, NEAR OROVILLE, BUTTE COUNTY, CALIFORNIA.

tors tends to shift the nesting season of the whole avifauna to the more temperate portion of the calendar year, namely, March, April and May.

Hibernating insects do not emerge in this locality in any considerable numbers, nor are caterpillars and other larvae abundant until the early part of April; and by

the middle of May there is an abundance of seeds available. The appearance of these elements, insects and seeds, tends to show a close correlation with the nesting activities of the birds for which they constitute the chief articles of diet. (See fig. 29.) The flesh-eaters are probably less dependent upon seasonal fluctuations of food supply than any of the other groups, for rodents and rabbits, as well as birds which occasionally form items of their diet, are available at all seasons. The rodents and rabbits are undoubtedly more easily captured in the earlier part of the season when herbage is short. This factor may account for some of the early nesting activities of this group, but one can not thus explain the following records: Western Red-tail, April 20; Cooper Hawk, April 30; California Screech Owl, May 9. These records are of fresh eggs. The fact that rodents and rabbits are more numerous later in the season, due to reproduction, and the fact that the young of these are more inclined to wander than the adults and are probably less alert, would, it seems to the writer, tend to counterbalance the effects of higher herbage and fully foliated shrubs in the foraging activities of this group of birds.

From the above, one can infer that there is a decided positive correlation between the nesting season of these birds, when taken as groups, and the type of food consumed. Of course there are numerous instances of overlapping of individuals in different groups, but one must talk in terms of averages when making such inferences.

CONCLUSIONS

1. The birds in the vicinity of Oroville, Butte County, California, begin nesting activities in February, reach their peak the last two weeks in April, and decline rapidly after May 15.
2. The flesh-eating birds, as a group, begin nesting first and have the longest span of nesting season; the vegetable- and seed-eating birds, as a group, begin nesting last and have the shortest span of season; the other two groups are intermediate.
3. The four groups follow one another in their nesting activities in an order that tends to indicate a positive correlation between the availability of food used for young birds and the time of nesting.

Berkeley, California, April 4, 1933.

THE NESTING SEASON OF BIRDS IN DONIPHAN COUNTY, KANSAS

WITH TWO ILLUSTRATIONS

By JEAN M. LINDSAY

The analysis of the nesting season of birds near Oroville, California, by Mr. W. B. Davis, in this issue of the *CONDOR* (pp. 151-4) has prompted me to place on record a comparable lot of information dealing with the same subject in another part of the United States, namely, near the townsite of Geary, Doniphan County, Kansas. Various features of the latter survey have already been reported upon as follows:

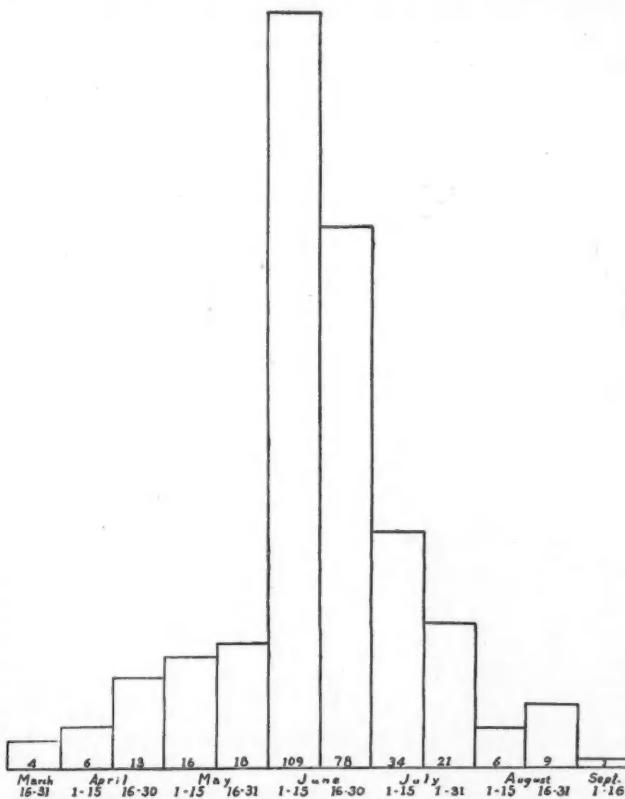


Fig. 30. CHART SHOWING NUMBERS OF OCCUPIED BIRD NESTS FOUND IN EACH TWO-WEEKS PERIOD FROM MID-MARCH TO MID-SEPTEMBER IN DONIPHAN COUNTY, KANSAS.

general accounts of the birds were given in the University of Kansas Science Bulletin (18, 1928, pp. 517-626); analysis of relations between plants and birds (*ibid.*, pp. 499-515); relative frequency of occurrence, *CONDOR* (30, 1928, pp. 180-184); environmental relations, Wilson Bulletin (40, 1928, pp. 157-177).

The two stations, Oroville, California, and Atchison (8 mi. from Geary), Kansas, which mark the locations of the areas studied and which have weather recording stations that furnished records of climate, are located at $39^{\circ} 29' N.$ $121^{\circ} 36' W.$ and $39^{\circ} 33' N.$ $95^{\circ} 10' W.$, respectively. In other words they are at nearly the same latitude but they are approximately fourteen hundred miles apart from west to east. The two areas are both under 1000 feet altitude, the California one being under 500 feet. Work was done at the Kansas locality between 1921 and 1925, but most of the records were obtained in two seasons. The California records show 333 nests of 51 species and the Kansas records, 315 nests of 57 species.

The chart (fig. 30) and tabulation of nests found in northeastern Kansas show that the nesting season extends from the middle of March to the middle of September. These limits would probably be extended by the addition of more observations, but it is not likely that the peak of nesting shown for the first two weeks of June would be shifted by more examples, no matter how extensive.

A rough classification of the nests according to their height from the ground gives an indication of the type of nester best suited for the general region. The following are the classes of heights distinguished and the number of nests found in each: under 2 feet, 30; 2 to 5, 85; 5 to 7, 43; 7 to 10, 35; 10 to 12, 17; 12 to 15, 18; 15 to 20, 20; 20 to 25, 16; 25 to 30, 10; 30 to 35, 3. Total, 277 nests. Thirty per cent or more than one-fourth of these nests were at heights between two and five feet from the ground.

The distribution of the nests by habitats is notable because of the close parallel between the numbers of nests and the numbers of species observed in the same types of habitat. In the following list of ten of the habitat divisions recognized are shown (1) the number of nests found and (2) the number of kinds of birds recognized in the same type of habitat at some time of the year. *Typha*, 14, 26; *salix-populus*, 74, 101; *creek-bottom*, 20, 80; *bluff*, 98, 109; *sprouts*, 10, 11; *orchard*, 9, 21; *road*, 23, 43; *pasture*, 10, 16; *yard*, 36, 51; *buildings*, 13, 14.

TABULATION OF NESTS FOUND IN DONIPHAN COUNTY, KANSAS

Species	Number of nests	Earliest date	Latest date	Estimated date for fresh eggs
Green Heron.....	1	June 5, 1923	.....	May 15
Turkey Vulture.....	1	June 6, 1923	.....	May 1
Cooper Hawk.....	2	June 7, 1922	June 11, 1922	May 15
Red-tailed Hawk.....	1	March 31, 1923	.....	April 1
Bob-white.....	1	June 10, 1922	.....	May 15
Mourning Dove.....	22	April 22, 1924	July 18, 1923	May 15
Yellow-billed Cuckoo.....	27	June 9, 1922	Sept. 9, 1923	June 15
Long-eared Owl.....	1	March 30, 1924	.....	March 15
Whip-poor-will.....	1	June 14, 1923	.....	June 1
Chimney Swift.....	2	July 16, 1923	July 18, 1923	June 15
Ruby-throated Hummingbird.....	10	June 4, 1923	August 5, 1922	June 15
Northern Flicker.....	1	June 10, 1923	.....	May 1
Red-bellied Woodpecker.....	1	April 29, 1923	.....	May 1
Red-headed Woodpecker.....	5	June 8, 1923	August 21, 1922	June 1
Hairy Woodpecker.....	1	April 29, 1923	.....	May 1
Downy Woodpecker.....	5	May 12, 1923	June 8, 1922	May 15
Kingbird.....	3	June 17, 1922	June 23, 1922	June 1
Phoebe.....	5	April 15, 1923	June 5, 1923	May 1
Acadian Flycatcher.....	2	June 14, 1922	June 26, 1923	June 15
Wood Pewee.....	4	June 21, 1922	July 18, 1923	June 15
Tree Swallow.....	4	June 7, 1923	June 13, 1922	May 15
Rough-winged Swallow.....	1	May 18, 1924	.....	June 1

Species	Number of nests	Earliest date	Latest date	Estimated date for fresh eggs
Barn Swallow.....	2	June 9, 1922	June 8, 1923	June 1
Blue Jay.....	8	April 20, 1924	June 16, 1922	May 15
Crow.....	7	March 31, 1923	June 11, 1922	April 15
Black-capped Chickadee.....	5	April 14, 1923	June 9, 1922	May 1
Tufted Titmouse.....	3	May 19, 1923	June 28, 1923	May 15
Western House Wren.....	6	June 9, 1922	July 11, 1923	June 15
Carolina Wren.....	7	April 21, 1924	August 28, 1923	May 15
Prairie Marsh Wren.....	1	May 30, 1924	.....	June 15
Catbird.....	5	June 7, 1923	July 16, 1923	June 15
Brown Thrasher.....	8	May 29, 1924	July 18, 1923	June 1
Robin.....	7	May 13, 1923	July 16, 1923	May 15
Wood Thrush.....	9	June 4, 1923	August 9, 1922	June 1
Bluebird.....	7	April 14, 1923	July 16, 1923	May 15
Blue-gray Gnatcatcher.....	4	June 4, 1923	June 19, 1922	June 15
White-eyed Vireo.....	1	June 29, 1923	.....	June 15
Bell Vireo.....	8	June 5, 1923	June 17, 1922	June 15
Red-eyed Vireo.....	6	June 7, 1923	August 23, 1921	June 15
Prothonotary Warbler.....	5	June 12, 1923	June 23, 1922	June 15
Yellow Warbler.....	2	June 7, 1923	June 8, 1923	June 1
Kentucky Warbler.....	1	June 30, 1923	.....	June 1
Maryland Yellow-throat.....	3	June 7, 1923	June 12, 1923	June 1
Yellow-breasted Chat.....	10	June 5, 1923	July 19, 1923	June 15
Yellow-headed Blackbird.....	1	May 30, 1924	.....	June 15
Red-winged Blackbird.....	14	May 29, 1924	June 14, 1922	June 1
Orchard Oriole.....	5	June 3, 1923	July 16, 1923	June 15
Baltimore Oriole.....	7	June 4, 1923	June 26, 1922	June 15
Bronzed Grackle.....	1	June 17, 1923	.....	June 1
Scarlet Tanager.....	1	June 15, 1922	.....	June 15
Summer Tanager.....	3	June 21, 1923	July 15, 1923	June 15
Cardinal.....	38	April 20, 1924	July 19, 1923	May 15
Rose-breasted Grosbeak.....	2	June 13, 1923	June 17, 1923	June 15
Indigo Bunting.....	18	June 8, 1923	August 23, 1922	June 15
Dickcissel.....	6	June 9, 1922	August 23, 1923	June 15
Lark Sparrow.....	1	June 9, 1922	.....	June 1
Field Sparrow.....	2	June 14, 1922	July 18, 1923	June 1

SUMMARY OF RECORDS OF BIRDS AND CLIMATE IN DONIPHAN COUNTY, KANSAS,
AND BUTTE COUNTY, CALIFORNIA.

Temperature in Fahrenheit. Precipitation in inches. Kansas weather records from Atchison and Leavenworth; California records from Oroville.

	January	February	March	April	May	June	July	August	September	October	November	December	Summary
Kansas													
Days of field work.....	6	11	9	14	15	40	16	42	20	12	9	6	200
Number of species noted.....	41	42	64	95	124	106	73	114	121	62	59	34	196
Most species in one day.....	27	25	45	46	78	61	41	56	64	34	36	25	78
Nests found.....	—	—	4	19	34	187	55	15	1	—	—	—	315
Mean temperature.....	25.4	31.6	40.8	54.4	64.6	73.4	78.0	76.2	67.4	56.0	41.5	32.6	53.5
Precipitation.....	1.10	1.37	1.87	2.92	4.49	5.15	4.22	4.21	3.58	2.42	2.09	1.88	34.80
California													
Nests found.....	—	8	43	174	103	5	—	—	—	—	—	—	333
Mean temperature.....	46.8	50.6	54.8	59.5	66.1	74.5	80.2	78.6	73.0	65.4	55.9	47.8	62.7
Precipitation.....	6.22	4.22	4.03	1.80	1.50	0.37	0.03	0.01	0.74	1.46	3.18	4.89	28.33

Turning to a more direct comparison of the nesting seasons of the birds in the two areas it is noticed first that the shapes of the two column diagrams are closely alike but that they come at different times of the year. In the Kansas locality the peak of the nesting season comes during the first two weeks of June and it is at least six weeks later than the California one, in the last half of April. These diagrams

appear to show beyond any reasonable doubt that the difference in time of nesting here represented is a true one and not merely the consequence of personal peculiarities in methods of making or recording observations.

One difference in the records, of possible significance, is that Mr. Davis' dates in every case represent time of finding fresh eggs, while mine are indicative merely of occupied nests. After closely examining the whole lot of records with this point in mind I have reached the conclusion that about as many nests were found in stages of construction as were found with young so that the final averages are comparable fairly with the California records.

I might point out that my concern here is with the nesting season of all the species as a composite fauna and not an analysis of single species. The results of these two types of enquiry might differ, but preliminary studies of single species and of closely related ones indicate that single species in the two localities show the same sort of difference in nesting season as does the whole bird population.

Any attempt to analyze the nesting seasons at these two localities and to interpret the differences in time, involves an understanding of the factors which determine the time of nesting. Several ways of approaching this problem have been tried by laboratory and field workers. Usually each worker has dealt with only a single factor, with the result that single elements have been emphasized as though they represented the chief or only influences in the problem. One fault connected with many of these explanations is the intolerance of many of their proponents toward other possible explanations. Circumstances which might be thought of as important to consider in the present comparison involve the following: genetic factors in species represented; conditions in the winter homes of the birds; altitude; rainfall; temperature; photoperiodism; food supply.

As a basis for approaching this problem previous work on the physiology of reproduction in birds and other vertebrates seems to indicate that the seasonal cycle of egg laying results from the genetic constitution of each species, which determines the manner of response to external, and seasonally variable, factors. These factors appear to influence the activity of the reproductive system through the complex and interrelated system of endocrine glands. Furthermore, the bulk of the information seems to point to the pituitary as the organ most directly concerned in coordinating the internal rhythm with external factors.

As to temperature Tollenaar (1922, abstract in *Exp. Sta. Rec.*, 48, 1923, p. 172), who worked on several kinds of wild birds over a four year period designed to show the influence of food supply and temperature on egg production during the different years, observed that the beginning of the laying period varies with different species, but the time of beginning was somewhat correlated with the previous 10-day temperature, and more closely correlated with the temperature from January 1 to the time of laying. Possibly a slight over-emphasis of the effect of temperature was given by Rowan by the comment (*Proc. Boston Soc. Nat. Hist.*, 39, 1929, p. 202) that "the spring recrudescence of the gonads of birds is universally attributed to rising temperatures."

Rowan's own views can be expressed by quoting (*op. cit.*) his summarized statement that "it has been shown that the rhythm of the reproductive organs of the Junco (and several other species) can be interrupted almost at will by appropriate manipulation of the lighting conditions." He added that these organs "appear to show a remarkable dependence on the lighting conditions" but that "increasing periods of compulsory exercise in almost complete darkness substituted for light increases will effect recrudescence of the organs in similar manner. . . . It is therefore suggested

that the light increases in reality afford the birds the opportunity of increasing exercise and that this is the crucial factor in inducing the development of the gonads."

The investigations by Rowan, Bissonnette, and others appear to demonstrate that phenomena connected with the changing length of day in spring in temperate lati-

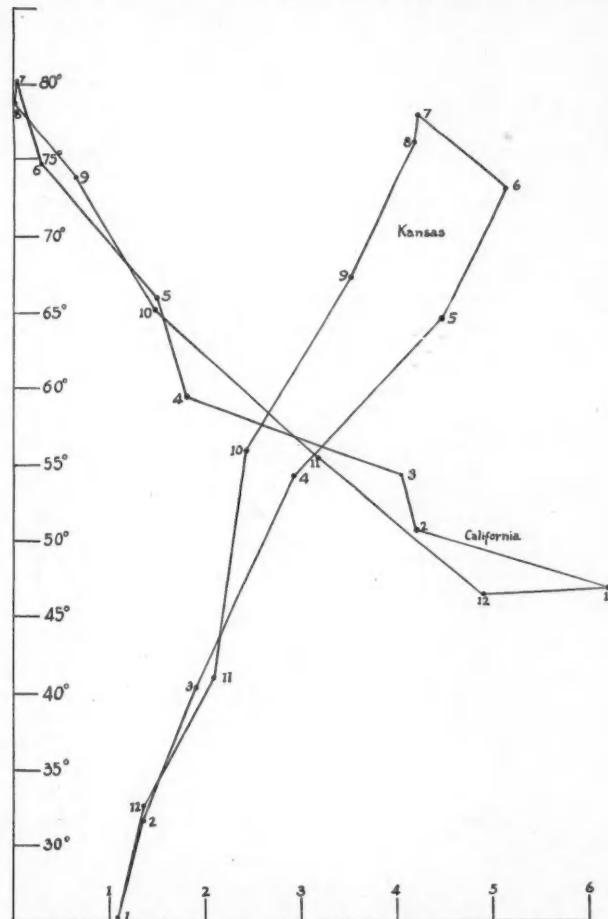


Fig. 31. HYTHERGRAPHS FOR OROVILLE, CALIFORNIA, AND NORTH-EASTERN KANSAS (LEAVENWORTH AND ATCHISON). TEMPERATURE IS REPRESENTED IN DEGREES FAHRENHEIT, PRECIPITATION IN INCHES. NUMBERS BESIDE POINTS ON THE FIGURES DESIGNATE MONTHS OF THE YEAR.

tudes are important in establishing the time of nesting. If the time of beginning of the breeding cycle were entirely or even largely determined by length of day, we might expect birds in the same latitude to have closely similar calendars of breeding activities. The circumstance that the two present examples represent the nesting

seasons of localities at the same latitude offers an opportunity to test the applicability of this theory and to compare effects of photoperiodism with other factors. The difference in the seasons in this comparison must be due to some factor other than the one connected with light changes.

Climates of the two regions are represented by hythergraphs in figure 31. Examination of these graphs in connection with the diagrams of the nesting seasons brings the suggestion that when the birds are beginning to nest in California the weather in Kansas is much too cold to favor nesting activities and at the peak of the season in Kansas the heat and drouth in California are not conducive to nesting. That these conditions are really unfavorable for nesting follows from Mr. Davis' suggestion of a positive correlation between availability of food for young birds and time of nesting. The availability of food whether of animal or plant material seems to be obviously and rather directly dependent upon favorable climatic conditions. Abundance of plant growth and the insects which depend upon it requires warmth and moisture in combination.

Apparently in the two localities here dealt with the birds nest when forage conditions are best even if this comes six weeks later in one place than in the other and contrary to the expectation that the equality in advance of day-length might prescribe a common nesting season for both places. However, this condition need not be accepted as a denial of the effectiveness of the photoperiodic factor, but rather as an example of a way in which that effectiveness may be modified. In this case the modification seems to be mainly the result of varying climates which are determined by positions of the localities on the continent. It happens here that for an indicator of favorable time for nesting, graphs representing climate (precipitation and temperature) serve better than the advance in length of light periods as measured by chronological advance of season.

Museum of Vertebrate Zoology, University of California, Berkeley, April 21, 1933.

FROM FIELD AND STUDY

A Peculiar Feeding Habit of the Short-billed Gull.—On several occasions during the past season (February 6, 15; March 2 and 3, 1933), I have observed Short-billed Gulls (*Larus canus brachyrhynchus*) obtaining food in shallow water of the lagoon at the mouth of the Carmel River, California, in a manner which I have never seen described before.

When the sand bar dividing the lagoon from the sea has been opened up, frequently by artificial means, a large area of coarse sand, with shallow river channels winding through it, is exposed where previously lay the pent up river water augmented by winter rains. In these rivulets, or in certain parts of the flats where a small bit of still water has been cut off from the flowing courses, I have seen both adult and immature birds standing in an inch or two of water and briskly paddling their webbed feet up and down alternately, then stopping to peck lightly at the surface of the water thus stirred up from the bottom. Sometimes they will paddle and peck at the same time. The process apparently serves a purpose similar to the whirling of the Northern Phalarope (*Lobipes lobatus*).

Once I saw a bird feeding in this fashion in a shallow water course leading out of the meadow bordering the lagoon where the bottom was quite muddy, but the other occasions have been where there was a coarse, sandy bottom. Seven individuals on February 6 were seen to indulge in this activity simultaneously. It was in this same rivulet draining the marsh, but at a point farther down stream where the water was flowing over sand.

On two occasions I have watched a Coot (*Fulica americana*) walking behind a Short-billed Gull to peck at the surface where the latter had been paddling. Once the Coot made a pass with its bill at the gull to drive it away from such a place.—LAIDLAW WILLIAMS, Carmel, California, May 1, 1933.

Three Magpies Rob a Golden Eagle.—The eagle is often regarded as "king of the air," but there are times when the eagle's supremacy may be seriously questioned, as will be seen from the following incident.

On August 23, 1932, at Igloo Creek in Mount McKinley National Park in Alaska, I watched three magpies (*Pica pica hudsonia*) successfully take a ground squirrel away from an adult Golden Eagle (*Aquila chrysaëtos canadensis*). When first observed, the eagle was standing on and eating a ground squirrel that it had just captured. Three magpies flying by stopped to investigate. After the situation had been carefully surveyed by the magpies walking completely around the eagle, two of the magpies took turns swooping down at the eagle's head. This attack was repeated five times with increasing intensity until the eagle struck back at its tormentors. In doing this it was forced to relinquish its hold on the squirrel in order to use its talons. While the eagle's attention was thus engaged, the third magpie sneaked in, on the ground, and carried off the squirrel, which was later shared without fighting with the other two magpies.

Interpretation of bird behavior by human beings is open to criticism, but the question naturally arises—was this robbery planned?—JOSEPH S. DIXON, Wild Life Division, U. S. National Park Service, Berkeley, California, February 10, 1933.

The Eastern Brown Thrasher at Altadena, California.—About the middle of February of this year, Mr. Jack Abbott of Altadena told me that friends of his had reported the presence of a Brown Thrasher at a feeding station near the bank of the Arroyo Seco. The following Sunday, Mr. Abbott and I called at the place but, though we waited several hours, the stranger failed to put in an appearance. During the following week, word came that the bird had returned, so, on March 5, armed with a camera, I again watched the station and was rewarded by several views at a range of five or six feet. On March 12, Mr. Abbott and I compared the living bird with skins of both the Brown and Sennett thrashers. This direct comparison, backed by the accompanying photographic evidence (fig. 32), would appear to place the Brown Thrasher (*Toxostoma rufum*) definitely on the list of California birds. In this connection it is well to recall that Baird, Brewer and Ridgway (*Hist. North Am. Birds*, 3, 1874,

p. 500) cite the species from California, their basis being the statement by Dr. Cooper that he had seen, "unmistakably", a bird at Clear Lake [Lake County] in September, 1870. It is probable that Dr. Cooper's record is a perfectly valid one, although up until now it has, properly, been accorded only hypothetical standing.

The exact locality of the present record is 614 West Mariposa Street, Altadena. This is a residence surrounded on three sides by orange groves and close to the east bank of the Arroyo Seco. Mr. and Mrs. Rodewald, the owners of the property, tell



Fig. 32. EASTERN BROWN THRASHER AT ALTADENA, CALIFORNIA. PHOTO TAKEN MARCH 12, 1933.

me that the thrasher was extremely wild when it first appeared about December 1, 1932. It was certainly very shy and wary on the two occasions when I saw it, and there was nothing in its manner or appearance to suggest an escaped cage bird. My sincere thanks are due to Mr. and Mrs. Rodewald, not only for their courtesy in permitting a total stranger to use their sun room as a blind and observation post, but for their assistance in helping to secure several pictures of this rare visitor, which, at the date of writing, is still coming to the station.—A. J. VAN ROSSEM, California Institute of Technology, Pasadena, California, March 23, 1933.

Winter Occurrence of Turkey Vultures in the Napa Valley, California.—While driving north in the Napa Valley, between Yountville and Oakville on January 15, 1933, I noted several Turkey Vultures (*Cathartes aura septentrionalis*) flying about a hill near the road. I stopped my car and counted fifteen of them. Returning two hours later past this same point, there were more buzzards in the air. I drove a short distance on a side road on this return trip in order to get directly below the soaring birds, and observed them for about ten minutes with my field glasses, counting fifty-nine in the air at one time. Some flew low down while others were high in the air. It would seem that there must have been one or more large dead animals on or near the hill. My notes do not record any previous winter occurrence of Turkey Vultures in the northern part of the San Francisco Bay region.—EMERSON A. STONER, Benicia, California, March 14, 1933.

The Long-eared Owl as a Ratter.—Norway or barn rats (*Rattus*) as a rule have rarely been represented in the diets of the mid-west Long-eared Owls (*Asio wilsonianus*) which I have studied (CONDOR, XXXIV, 1932, pp. 178-180); whether this was due to lack of availability of the rats as prey, or to reluctance on the part of the owls to attack them, or to difficulty in handling the prospective victims, my previous data do not tell.

However, one lot of 177 complete and fragmentary pellets, the 1932-1933 winter deposit from beneath a favorite roost tree used by as many as four Long-eared Owls at once, contained the skulls of 11 adult rats. The other contents of the pellets determined mainly on the basis of skulls were: meadow mouse (*Microtus*), 142; deer mouse (*Peromyscus*), 47; house mouse (*Mus*), 3; shrews (*Blarina* 2; *Sorex* 3), 5; English sparrow, 1; junco, 1; total, 210 individuals. Analyses were made by Mr. F. N. Hamerstrom, Jr., of the Iowa State College zoology staff, and by myself.

The pellets were collected from the Des Moines, Iowa, city waterworks grounds, a large wild life refuge teeming with mammals and birds. Inasmuch as rats were procurable chiefly from the vicinity of farm buildings and a relatively few quail feeding stations at a time when native mice were known to outnumber them far more than the pellet ratio shows, it is not easy to provide a truly plausible explanation for the disproportionate pressure upon this one species.

Aside from the possibility of the owls exhibiting an actual preference for rats as prey (which I seriously question), these new data may be looked upon as adding more weight to the evidence already at hand as to the alien rat being exceptionally vulnerable, even at low population densities, to the preying of native owls. Peculiarities of behavior, conspicuousness, lack of racial familiarity with specific predatory perils, confinement in woods and fields to restricted habitats (such as corn shocks and other rich food sources in winter) may be terms that perhaps will ultimately serve to explain one more ecological relationship now obscured by the usual unknowns.—PAUL L. ERRINGTON, Department of Zoology and Entomology, Iowa State College, Ames, Iowa, April 7, 1933.

Records from North Central Arizona.—The following observations were made during field work in the general region of the San Francisco Mountain Plateau in late October, 1932. Oak Creek Lodge is located in Oak Creek Cañon, twenty-three miles by road southwest of Flagstaff, at the point where West Fork joins the main cañon. Sedona post office is on Oak Creek seven miles south of Oak Creek Lodge.

Ardea herodias treganzai. Treganza Heron. Individuals recorded on Oak Creek a short distance below Sedona post office on October 29 and November 1, may be of interest because of the few records for herons in this region.

Buteo regalis. Ferruginous Rough-leg. In a roadside zoo maintained in connection with a filling station at Cañon Diablo, on Highway 66 between Winslow and Flagstaff, I found two immature birds that had been taken during the summer from a nest in Anderson Pass about twenty-six miles southeast of Flagstaff. These birds, reared by hand and remarkably tame, were secured for the National Zoological Park and are now on display in Washington, D. C. This seems to be the first record for the breeding of this species in Arizona. On October 26 two of these hawks were seen soaring below El Tovar in the depth of the Grand Cañon.

Falco columbarius bendirei. Western Pigeon Hawk. At Turkey Tanks, eighteen miles by road northeast of Flagstaff, at an elevation of 6000 feet, on October 20, I shot a pigeon hawk in hot pursuit of a robin. Mr. L. L. Hargrave and I recorded another at Heiser Spring on October 21. The specimen taken has the dark coloration typical of this western race.

Capella delicata. Wilson Snipe. One was seen near Oak Creek Lodge on October 30.

Glaucidium gnoma pinicola. Rocky Mountain Pygmy Owl. Near Oak Creek Lodge at an elevation of 5300 feet these small owls were fairly common. A male was taken at dusk on October 28, and the birds were heard calling regularly.

Cincclus mexicanus unicolor. American Dipper. Near Oak Creek Lodge the Dipper is found regularly. An immature male was collected October 30.

Nannus hiemalis pacificus. Western Winter Wren. On October 28 I collected a male on the West Fork of Oak Creek about two miles from Oak Creek Lodge. The

bird was in dark shadow under a Douglas fir. On November 2 I heard one singing in this same area. There are few records for this bird in the State.

Thryomanes bewickii eremophilus. Baird Wren. Two were seen and one was taken two miles below Sedona post office on October 29. As observations increase, this wren is found to have a wider range in Arizona than formerly was supposed.

Hylocichla guttata sequoiensis. Sierra Hermit Thrush. On October 29 hermit thrushes were common two miles below Sedona in a cañon leading into Oak Creek from the west. Five taken, including four males and one female, all belong to this race.—ALEXANDER WETMORE, U. S. National Museum, Washington, D. C., March 8, 1933.

Nocturnal Singing of the Western Meadowlark.—A search through what ornithological literature I have available fails to disclose any published reference to night singing of the Western Meadowlark (*Sturnella neglecta*). My observations concerning the nocturnal singing habits of this bird in extreme northwestern Montana may therefore be of interest.

In this locality, songs of the Western Meadowlark can be heard at night regularly from about the middle of April until the middle of June. (Usual daytime songs are heard daily from the date of spring arrival of the birds, early in March, until the time of their departure in October.) Singing is not continued for any length of time during the night; instead, it seems to be done at occasional awakenings, which occur at all hours of the night, but most frequently between dark and midnight. Although generally only one song is given by a bird during one awakening, frequently two to as many as twelve songs are uttered, at intervals ranging from a few seconds to a minute or longer. Often a song by one bird is followed at once by songs from one to four other birds within hearing range of the first.

The songs given by the birds at night are usually their typical territory songs. Sometimes a song will be broken off abruptly after the first two or three notes have been given. All singing is done with fully as great vigor as during daylight hours.—WINTON WEYDEMEYER, Fortine, Montana, April 29, 1933.

White-crowned Sparrow Records from Southern California.—Because of recently published records of the White-crowned Sparrow (*Zonotrichia leucophrys leucophrys*) in the coast district of southern California, it seems worth while to place on record the only occurrence, known to me, of this form at Buena Park, California. On the afternoon of May 1, 1929, an adult bird appeared at my banding station and was at once recognized as being different from the Gambel Sparrows (*Zonotrichia leucophrys gambelii*), the last of which had come to my traps on April 21. I set several traps, and in about an hour, captured this bird. It was photographed by Mr. James A. Calder, given band no. A116619, and released.

The occurrence of the White-crowned Sparrow in the Imperial Valley in the winter does not seem to have been recorded. On February 22, 1930, in the vicinity of the North Holtville Friends Church, about five miles north of the town of Holtville, I observed several White-crowned Sparrows in a flock of Gambel Sparrows along a roadside. November 27 and 28, 1930, Gambel Sparrows were common in the same location, but I failed to find any White-crowns among them. At the same place, February 19 and 20, 1933, two White-crowns were seen with a large flock of Gambel, and on February 21, an adult male was collected and is now no. 117 of my collection.—JOHN MCB. ROBERTSON, Buena Park, California, March 21, 1933.

The Vulture's Fair-way.—In the latter part of July, 1932, I traversed the seaward roads down the northwest coast of California from Humboldt Bay to Bodega Bay, keeping just as close to the ocean as the presence of any through road permitted. The 17th of July found me at Mendocino Light, on Cape Mendocino, Humboldt County. Offshore were many surf-beaten rocks upon which could be seen groups of Steller sea-lions. Along a beach against the sea cliff below me I could see dark objects, which I presently learned were carcasses of sea-lions. As I was told by Mr. M. M. Palmer, the affable officer on duty at the light station, some men whose camp he pointed out had been killing sea-lions on the rocks, solely for the whiskers and certain other parts of

the bulls which could be sold at a profit in the Chinese market. About seventy-eight of the animals had thus been killed the current season, some of the bodies washing ashore, there to putrefy.

A strong westerly breeze was blowing up the slope from the sea, and notable features of the scene were Turkey Buzzards. Here and there was a buzzard in flight close along the slopes above me. Across a ravine from the lighthouse, twenty-one of

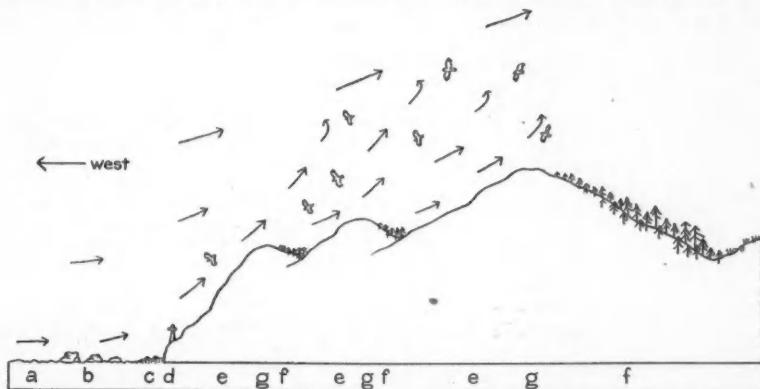


Fig. 33. EXPLAINING RELATIONSHIPS OF TURKEY BUZZARDS IN NORTHERN COAST DISTRICT OF CALIFORNIA TO TERRAIN, EASTWARD-MOVING AIR STREAM, AND UP-WELLING AIR CURRENTS. *a*, PACIFIC OCEAN; *b*, OFFSHORE ROCKS; *c*, BEACH AT BASE OF SEA-CLIFF WHERE DEAD SEA-LIONS ARE STRANDED; *d*, MENDOCINO LIGHTHOUSE; *e*, OPEN WEST-FACING SLOPES WHERE UNGULATE MAMMALS GRAZE; *f*, TIMBER ON WIND-SHELTERED EAST-FACING SLOPES; *g*, RIDGE TOPS, ABOVE WHICH THE UP-WELLING AIR-CURRENTS ARE SOARABLE FOR THE BUZZARDS AND BRING ODORS FROM DOWN-CURRENT SOURCES.

the birds were roosting near together on the ground, up-wind from the carcasses. Whence this congregation? As I now think back over the above scene at Cape Mendocino, plus what I saw last summer of buzzards elsewhere down along the sea coast to Bodega, plus what I have seen from time to time through the years along the sea-paralleling mountain chains of California, a picture builds itself in my mind, of the following composition.

During the long summer season, in that portion of each day when the sea breeze blows, the buzzards are commonly seen, in soaring flight, mainly facing to the west or repeatedly wheeling up into the wind, but drifting in general courses mostly parallel to the axial trends of the long northwest to southeast ridges. In west-east position these soaring birds keep just above the westward brinks of the ridges, where they ride aloft on the up-welling air currents, with no need of a wing beat, even in minutes of time.

Not only do these habitually used fly-ways extending along the northwest-southeast trending ridges afford conditions for effortless flight, but also the courses of those fly-ways are such that each bird traversing them may constantly receive nasal notice of odors borne by the air currents sweeping up the long slopes from the west. With its presumably acute sense of smell a buzzard is likely at once to be apprised of the existence of any animal body which has reached a certain stage of decomposition more or less far down those slopes. Further exercise of the sense of smell, supplemented by keen eyesight and scouting flight, may then serve to guide the bird down the odor-bearing air currents to the source. (For a recent discussion of the sense of smell in buzzards, see F. M. Chapman in "My Tropical Air Castle," Appleton, 1929, chapter vi, pp. 147-166.)

A conspicuous feature of our coast range landscapes is the prevalence of extensive, relatively bare areas on most if not all the seaward slopes—great tracts of grass-

land extending up to the tops of the ridges--while the whole eastern slopes of the ridges and the bottoms of the ravines sheltered from the prevailing winds are timbered, or at least clothed heavily with chaparral. These sloping grasslands formerly teemed with wild ruminant animals—elk, deer (at the edges of the chaparral), antelope (toward the south), with large carnivores as well as other fatal factors to account for a continuing supply of carrion from these vegetarian sources. And now the same slopes are grazing grounds of cattle, horses and sheep; while the seashore at the farthest bottom frequently, now as always, yields the bodies of seals, whales and the like.

In summary, if my inferences be tenable all through, the Turkey Vultures, *Cathartes aura*, [and formerly the California Condors (*Gymnogyps californianus*) which we know to have occurred regularly north near the sea at least as far as the "prairies" of Humboldt] gain an easier than ordinary livelihood in our coast range territory by taking advantage of certain favorable circumstances—those circumstances of (1) east-moving air currents, sweeping up wide expanses of open grassy slope (2), which afford (3) odor-producing food. The birds seek this food by (4) riding the up-welling air currents near the crests of the ridges, which currents bring olfactory notice (5) of the food then to be sought for through the vultures' scouting flight (6), and lastly to be seen (7) by keen eyes because of the open nature of the ground surface on those western slopes.—J. GRINNELL, *Museum of Vertebrate Zoology, University of California, Berkeley, January 22, 1933.*

Phainopepla Observed on Barley Flats, San Gabriel Mountains, California.—On December 30, 1932, while engaged in a botanical survey of the Barley Flats area, north of Mount Wilson in the Angeles National Forest, Los Angeles County, my attention was called to a single female Phainopepla (*Phainopepla nitens*).

The elevation of Barley Flats at the place of observation is 5500 feet. At the time of observation, snow covered the entire region to a depth of about a foot.

The bird was observed first at 11 a. m. and again at 2 p. m. and lastly at 3:30 p. m. This would seem to indicate no desire on the part of the bird to leave this location. It seems strange that the Phainopepla, ordinarily so closely associated with a warm environment, should visit so cold a one when the Mohave Desert is no great distance away.—L. E. HOFFMAN, *University of Southern California, Los Angeles, California, March 22, 1933.*

Black Phoebe Nesting in a Tree.—In looking over some old notebooks recently, I came across the record of a tree nest of the Black Phoebe (*Sayornis nigricans*). The usual nesting site of the Black Phoebe is under a bridge, or about buildings, and one that I found in 1926 was on a timber, about four feet below the ground, in an open well. I know of no case, other than the one here noted, of the nest being placed in a tree. On May 15, 1910, I found this nest while exploring a very thick growth of willows along an old flood channel of the San Gabriel River, about two miles southwest of Artesia, California. The flood channel had about two feet of stagnant water in it, and the willow trees on either bank leaned out over the water. One tree, about eight inches in diameter, had a dead limb on its lower side extending downward at a sharp angle, and on the end of this was a typical mud nest of the Black Phoebe, containing two young birds about a week old. The parent birds were nearby. Shreds of willow bark had been used with the mud and fringed the outside of the nest; the lining was of bark and hair. The nearly horizontal trunk of the tree formed a shelter about six inches above the nest which was about three feet from the water. The nearest building was about a quarter of a mile from this nest.—JOHN MCB. ROBERTSON, *Buena Park, California, March 21, 1933.*

Tracing Fall Wandering by an Albino.—In the CONDOR for July, 1932 (page 194), Mrs. Catherine E. Bower records the presence of a nearly completely albino Blue-fronted Jay (*Cyanocitta stelleri frontalis*) at Big Creek, Fresno County, California, from September 16, 1931, until November when it was observed down cañon at Power House (Number 2), a distance (by road) of ten miles.

I believe this is the same albino jay observed by myself and others that same fall at Huntington Lake, above Big Creek, from August 15 to about August 30, at which time we left the region. This would give the bird sixteen days to drift along the

lake from Cedar Crest Camp to the cañon of Big Creek and down the abrupt gorge to the town of Big Creek, 2000 feet below.

The air line distances between these three stations is but eight miles in all, yet the jay dropped in altitude from 7000 feet to 3000 and accomplished this in the short interval between September first and November first. This means the traversing of three life-zones: Huntington Lake at 7000 feet being Canadian, the town of Big Creek at 5000 feet being Transition, and Power House Number 2 at 3000 feet being Upper Sonoran. In autumn and winter this species becomes more numerous in the lower mountain habitats. That individuals or flocks may wander from one extreme of the vertical range to the other seems interesting in a species considered to be a permanent resident and which is never completely absent from any part of its range.

I do not hesitate to connect Mrs. Bower's record with mine because of the perfect tally in description, the wandering status of the race at that season, the natural drainage channels leading to Big Creek and Power House Number 2, and the sequence of dates.

It may be added to Mrs. Bower's description that the present writer was impressed with the bluish tinge to the white plumage; this was most readily observed in the quills of wing and tail. I believe this is the graying effect noted by Mrs. Bower. The bird was almost fearless, fitting and hopping close to groups of campers.—ROLAND CASE ROSS, *Los Angeles, California, March 22, 1933.*

Bird Notes from Southwestern Oregon.—It was the authors' privilege to spend a few days in December, 1932, in the vicinity of Medford, Jackson County, Oregon. Frequent field trips were made in the Rogue River Valley and in the lower levels of the Siskiyou and Cascade mountains. A study of a recent paper by Gabrielson (*CONDOR*, 33, 1931, pp. 110-121) has led to the conclusion that some of the records obtained deal with species not often recorded from the Rogue River region. The number of duck records may be explained by the fact that large lakes to the east, such as Klamath Lake, had frozen over during a period of unusually cold weather in December and had driven birds to open streams. A list of the birds, all from Jackson County, follows.

Anas platyrhynchos. Mallard. Six of these birds were seen on Butte Creek, December 18.

Mareca americana. Baldpate. We examined a female of this species collected by Chester Fitch on Butte Creek, December 12.

Nettion carolinense. Green-winged Teal. A female was shot on Butte Creek, December 13, and is now in Stevenson's collection.

Nyroca affinis. Lesser Scaup. A female scaup was seen December 18 on Butte Creek.

Falco mexicanus. Prairie Falcon. A falcon was seen perched on a telephone pole at the Fitch Ranch, six miles south of Medford, on December 17.

Fulica americana. Coot. A coot was found swimming in Butte Creek December 18, and another, freshly killed bird, was discovered.

Capella delicata. Wilson Snipe. One was found in a tule swamp along Butte Creek, December 18.

Glaucidium gnoma californicum. Pygmy Owl. A female (no. 62760, coll. Mus. Vert. Zool.) was shot from a Garry oak at the Fitch Ranch on December 15. Another female, collected in a willow thicket along Butte Creek, December 18, is now in the Stevenson collection.

Scotiaptex nebulosa nebulosa. Great Gray Owl. Fitch saw one of these owls on the Lake of the Woods highway, seven miles east of Ashland, December 16, altitude 2800 feet. Fitch collected a specimen of this species (sex unknown), during the last week of December, 1929, at the Fitch Ranch. The skin is now in his collection.

Dryobates albolarvatus albolarvatus. White-headed Woodpecker. A male was seen in yellow pine timber at 3100 feet elevation on the Lake of the Woods road, December 16.

Chamaea fasciata subsp. Wren-tit. A colony of these birds is established in the Garry oak and chaparral area on the Fitch Ranch. Birds were seen and heard several times during the latter part of December.

Salpinctes obsoletus obsoletus. Rock Wren. A female Rock Wren (no. 62771, coll. Mus. Vert. Zool.) was collected at a rocky hillside five miles east of Ashland on December 16.

Sialia currucoides. Mountain Bluebird. A flock of ten bluebirds was discovered in Douglas fir timber near Coleman Creek on December 18.

Bombycilla cedrorum. Cedar Waxwing. A flock of ten was found in an apple orchard south of Medford, December 18, and others were recorded a few days previously, from the vicinity.

Lanius borealis. Northern Shrike. A shrike was found chasing a flock of Pine Siskins near Butte Creek on December 18. The bird, an immature female, was killed, and is now in the Stevenson collection.

Zonotrichia leucophrys subsp. White-crowned Sparrow. Five White-crowned Sparrows were noted along Butte Creek, December 18, but none was collected.—JAMES STEVENSON and HENRY FITCH, Museum of Vertebrate Zoology, Berkeley, California, April 8, 1933.

EDITORIAL NOTES AND NEWS

The necessarily brief minutes (page 171 of this issue of the CONDOR) afford but a meager idea of the general worth of the eighth annual C. O. C. meeting. Persons in attendance derived both profit and pleasure from its varied program, and the opportunities given between sessions for informal conversations between individuals not usually associated brought further benefits. By invitation from the San Diego Society of Natural History, next year's meeting will be held in San Diego, probably in April.

In the June, 1933, issue of the *Wilson Bulletin*, Editor T. C. Stephens offers some cogent comments on the designation of localities in bird records and on specimen-labels. He tells of troubles he has experienced in locating place-names of early origin—just the same difficulties experienced by present bird students here on the Pacific Coast. Dr. Stephens says: "The authors of seventy-five years ago little realized how soon their locality terms would become obsolete; nor do we probably realize the changes which will take place in the next similar period of time. . . . Perhaps the only suggestion to be made is concerning the importance of including with every locality record, or list, a very full geographical description."

A notable feature of the May, 1933, issue of the *Murrelet* is Mr. F. S. Hall's account of the ornithological history of Washington State. After a general review of the early explorations of the northwest coast of North America, Archibald Menzies is dealt with at considerable length, he having been the "first naturalist to observe Washington birds", in May and June, 1792. Mr. Hall gives, with illuminating comment of his own, all the pertinent



Fig. 34. JOHN G. TYLER: AUTHORITY ON THE BIRDS OF THE SAN JOAQUIN VALLEY, CALIFORNIA, AUTHOR OF "THE BIRDS OF THE FRESNO DISTRICT" (PACIFIC COAST AVIFAUNA NUMBER 9), MEMBER OF THE COOPER ORNITHOLOGICAL CLUB SINCE 1905, AND NOW MEMBER OF ITS BOARD OF GOVERNORS.

excerpts from Menzies' journal. These are of special interest to anyone seeking to learn something about the primitive status of bird-life in areas now closely populated by mankind.—J. G.

Governmental reorganization in Manila has resulted in many changes recently in management and status of sundry divisions. Zoology in its various branches has been removed from the Bureau of Science, and, together with certain other activities, combined in a new departmental division, of the same standing as a "Bureau" and designated "Fish and Game Administration" of the Department of Agriculture and Commerce. The new division, besides zoological investigation, is concerned with oceanography; it has taken over "forest fauna" from the Bureau of Forestry, and it exercises supervision over game protection, fisheries, and the aquarium. Mr. Wallace Adams, formerly Director, Division of Fisheries, becomes Chief, and Insular Game Warden. Mr. Richard C. McGregor is made Chief of Publications of the Department, and will continue his editorial work on the Philippine Journal of Science. Mr. McGregor is Honorary Curator of Ornithology.—H.S.S.

MINUTES OF COOPER CLUB MEETINGS NORTHERN DIVISION

MARCH.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held at 8:00 p. m., Thursday, March 23, 1933, in Room 2003, Life Sciences Building, Berkeley, with about seventy-five members and guests present and Vice-president Miller in the Chair. Minutes of the Northern Division for February were read and approved. Minutes of the Southern Division for February were read. The following proposals for membership were made: Albert R. Brand, 47 Park Ave., White Plains, N. Y., Ludlow Griscom, Museum of Comparative Zoology, Cambridge, Mass., and Mrs. Lotta Bean Schwerin, Hotel Solano, Vallejo, Calif., by J. Grinnell; and Mrs. Fred C. Laskey, Graybar Lane, Nashville, Tenn., by E. L. Sumner, Sr., through the Western Bird Banding Association. A second reading was given to the proposal of the name of Arthur Cleveland Bent for election to honorary membership in the Cooper Club and the Chair asked for a motion so ordering. The motion was made by Mr. Dixon and unanimously carried.

Mr. James Moffitt reported having seen four White-cheeked Geese near Eureka, at the mouth of the Eel River, and told of others seen in Oregon by Stanley Jewett.

Mr. Moffitt stated that there are fewer Black Brant at Tomales Bay this year than last but that the birds are a month earlier. At Willows he noted a flock of about 2500 Whistling Swans and at Tule Lake, Honey Lake and Pit River Lake flocks of about 700 each. He estimated that probably 20,000 of these birds winter on the west coast. Mr. Alden Miller reported hearing a Green-tailed Towhee in Strawberry Canyon on March 18. Mr. Donald McLean reported the finding of the mummified remains of a Black Pigeon Hawk near San Jose.

Mr. Joseph Dixon was the speaker of the evening and gave an illustrated talk upon "Birds of the 1932 Mt. McKinley Expedition." During his stay in Mount McKinley National Park, Mr. Dixon found 112 kinds of birds within the Park area. The heavy snows of an unusually severe winter hampered field work, and some species found in 1926 were not seen in 1932. No Surf-birds were seen and no Kennicott Willow Warblers. Along the coast Bald Eagles seemed about as plentiful as in 1907 in spite of the one dollar bounty which is paid. Mr. Dixon told entertainingly of his observations on the inter-relationships existing between denizens of the Park.

Adjourned.—HILDA W. GRINNELL, Secretary.

SOUTHERN DIVISION

MARCH.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Tuesday, March 28, 1933, at 8:00 p. m., in the Los Angeles Museum, Exposition Park, Los Angeles. President Robertson occupied the Chair and about seventy members and guests were present.

Minutes of the Southern Division for February were read and approved. Minutes of the Northern Division for January and February were read by title only. The application of Oliver L. Austin, Jr., North Eastham, Cape Cod, Mass., proposed by Joseph Grinnell, was presented for membership.

At the request of the Chair, the secretary read the recommendation submitted by the Northern Division presenting Arthur Cleveland Bent, of Taunton, Massachusetts for Honorary Membership in the Cooper Ornithological Club. On motion by Dr. Loye Miller, seconded by Dr. Charles A. Warmer, and unanimously

carried by a rising vote, the Southern Division of the Club endorsed the action of the Northern Division proposing Mr. Bent to Honorary Membership. Following the usual course, this recommendation will be ratified at the April meeting of the Southern Division.

President Robertson called attention to a report of the Committee on the Preservation of Natural Conditions. This committee is under the Ecological Society of America. The report was forwarded in duplicate from Secretary Luck of the Pacific Division of the American Association for the Advancement of Science. If any member of the Cooper Club plans to attend the meeting of the Association, to be held in Salt Lake City, in June, he may secure a copy of the report from Mr. Robertson.

The program of the evening, "A Collecting Trip in Guatemala," was very entertainingly presented by Messrs. Herbert N. McCoy and George Willett. Mr. McCoy, with the aid of many splendid lantern slides, outlined the six weeks trip made by himself and wife and Mr. and Mrs. Willett. Views were shown of Mazatlan, San Jose, Guatemala, the Valley of the Montagua where camp was first made, Lake Atitlan at 6,000 feet, the cloud forest, and then of the headquarters of the United Fruit Company at sea level, where many courtesies were extended to them and pleasant accommodations provided. There were also slides showing methods of transportation, and some of the customs and dress of the native inhabitants.

This interesting introduction to Guatemala by Mr. McCoy was followed by Mr. Willett's account of the birds seen and collected. The excellent series of skins brought back from the trip were on exhibit and during the course of his talk Mr. Willett called particular attention to many of the species, including the specimen of the exceedingly rare Guan. With the exception of the hummingbirds, no birds were found nesting at this time of the year, mid-November to January, although a few specimens taken were in more or less breeding condition. The similarity to the North American fauna existing among the jays, towhees, woodpeckers, juncos, robins, and flickers of Guatemala was pointed out, as was the surprise at finding cactus wrens in the tops of high trees. The means by which one specimen of the fast-flying Collared Swift was collected, were of especial interest.

In order that a more informal discussion and view of the collected specimens might be had, the meeting was adjourned.
—LAURA B. LAW, *Secretary*.

APRIL.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on Tuesday, April 25, 1933, at 8:00 p. m., in the Los Angeles Museum, Exposition Park, Los Angeles. President Robertson occupied the Chair and about fifty-five members and guests were present.

Minutes of the Southern Division for March were read and, after corrections were noted, they were approved. Minutes of the Northern Division for March were read. The following proposals for membership were presented: Theo. H. Scheffer, P. O. Box 307, Puyallup, Wash., and Ernst Mayr, American Museum of Natural History, New York, N. Y., by J. Grinnell; Michael J. Magee, 603 South Street, Sault Ste. Marie, Michigan, by Harold Michener, and Arthur G. Butzbach, P. O. Box 62, Lower Lake, California, by E. L. Sumner, Sr., through the Western Bird Banding Association.

The recommendation proposing Arthur Cleveland Bent, of Taunton, Massachusetts, for Honorary Membership in the Cooper Club was presented for the second time, and on motion by George Willett, seconded by Wright M. Pierce, and unanimously carried by a rising vote, the Southern Division endorsed the action of the Northern Division in electing Mr. Bent to Honorary Membership.

An invitation to the Cooper Club from the California Audubon Society, Inc., to meet at the home of Mrs. Harriet Williams Myers, its president, on May 11, 1933, for a morning and afternoon program, was read.

The Chair called attention to the annual meeting of the Cooper Club to be held in Berkeley, California, on May 5 and 6, and it was hoped that quite a number from the Southern Division might find it possible to attend.

Because of conflicting with Memorial Day, it was decided to hold the May meeting of the Southern Division on Tuesday, May 23, a week in advance of the regular schedule.

Colonel John R. White, superintendent of the Sequoia National Park, was the speaker of the evening and gave an illustrated talk upon "The Big Trees and Big Mountains of the Sequoia National Park."

Before telling of the Park, however, Colonel White gave some interesting information regarding his early years in England and his contact with the English birds; of time spent in the Philippine Islands where his ornithological interest was renewed under Major E. A. Mearns, who taught him to skin birds, and of a still later period when, stationed at the penal colony on Palawan, he was able to collect a fine series of the Palawan Peacock Pheasant. Colonel White is also acting superintendent of the recently created Death Valley National Monument, and after his interesting description of the beauties of the Sequoia National Park, he very kindly permitted us to enjoy several excellent views of Death Valley and of that section which has been set aside as a national monument.

Adjourned.—LAURA B. LAW, *Secretary.*

EIGHTH ANNUAL MEETING

The Eighth Annual Meeting was held at the University of California, Berkeley, on Friday and Saturday, May 5 and 6, 1933. The sessions for presentation of papers were held in Room 2503, Life Sciences Building. The meetings opened with a brief word of welcome from G. B. Pickwell, President of the Northern Division. The program of papers presented was as follows: Friday morning: "Studies on the Distribution of the Western Mockingbird in California," John R. Arnold; "The Leconte Thrashers of the San Joaquin," Joseph Grinnell; "Comments upon the Systematics of Pacific Coast Steller Jays," James Stevenson; "Climate and Magpies," Jean M. Linsdale; "Ages of House Finches Trapped During February, 1933," Harold Michener and Josephine R. Michener, read by John McB. Robertson. Friday afternoon: "Wren-tit Population of Smythe Canyon [Berkeley]," Mary M. Erickson; "Seasonal Behavior of Some Banded Golden-crowned Sparrows," E. L. Sumner, Sr.; "Average Dates of Arrival of Summer and Winter Visitants in the San Francisco Region," Amelia S. Allen; "The Landing of a Gull on a Small Object in a Strong Wind," William E. Ritter; "Men and Birds in Joint Occupation of the National Parks," George M. Wright. Saturday morning: "Highlights of Utah Ornithology," William H. Behle; "The Vulture's Fair-way," Joseph Grinnell; "Some Problems of Classification and Nomenclature," Harry S. Swarth; "Span of Nesting Season of Birds as Related to Food Habits," William B. Davis; "Items from

the Field Notes of an Oologist," John G. Tyler; "Pterylography of the Osprey," Lawrence V. Compton; "The Midsummer Status of Certain Birds in the Lowlands of Southern California," John McB. Robertson; "Faunal Regions in Eastern Oregon and Northern Idaho," Alden H. Miller. Saturday afternoon: "Observations on the Life History of the California Quail," E. L. Sumner, Jr.; "A Project to Determine Mode of Flight of Swifts by Photography," George M. Wright; "The Vocal Apparatus of Owls," Alden H. Miller; "Some Observations of Horned Larks," Gayle B. Pickwell; "Nesting of the Wandering Tattler," Joseph S. Dixon.

On Friday afternoon the staff of the Museum of Vertebrate Zoology, together with several of the graduate students, held an open house in the Museum's main gallery at the west end of the Life Sciences Building. The bird, mammal and fur collections were opened to the visitors. On Friday evening motion pictures of birds were presented in Room 2000, Life Sciences Building; "Some Birds of the Stanford Campus" being presented by John B. Price of Stanford University, while "Life History Studies of the Red-bellied Hawk" were shown by Wright M. Pierce of Claremont. On Saturday evening at 7:00 o'clock an informal dinner was held at the Durant Hotel for members and guests. George M. Wright acted as toastmaster and several members responded to his calls. From fifty to seventy-five persons were present at the scientific sessions, more than two hundred attended the exhibition of motion pictures, and seventy-five were present at the dinner.—TRACY I. STORER, *Secretary.*

GOVERNORS' MEETING

The Twelfth Annual Meeting of the Board of Governors of the Cooper Ornithological Club was held at Berkeley, May 7, 1933. The Board was entertained at breakfast by Mr. and Mrs. George M. Wright at their residence, 1936 Thousand Oaks Boulevard, Berkeley. Neither president nor vice-president being present, the secretary called the meeting to order. George Willett was elected temporary chairman. The following were present: Mrs. A. S. Allen, H. W. Carriger, J. S. Cooper, J. S. Dixon, Mrs. H. W. Grinnell, Joseph Grinnell, C. B. Lastreto, J. M. Linsdale, A. H. Miller, G. B. Pickwell, W. M. Pierce, J. McB. Robertson, T. I. Storer, H. S. Swarth, J. G. Tyler, George Willett, and G. M. Wright. The following proxies were at hand: J. S. Appleton,

Ralph Arnold, H. C. Bryant, W. L. Chambers, Harry Harris, Mrs. Laura B. Law, Joseph Mailliard, Harold Michener, L. H. Miller, J. R. Pemberton, G. C. Rich and Curtis Wright by Tracy I. Storer; and L. B. Bishop by George Willett. Mr. A. J. Van Rossem was present by invitation for a short period.

Minutes of the Eleventh Annual Meeting were read and approved.

A report by Howard Robertson and Harry Harris for the auditing committee appointed to examine the accounts for 1931 and 1932, was read and accepted.

No report had been received from the Committee on Incorporation. Extensive discussion of difficulties involved in incorporation followed. Upon motion duly carried, the chairman was authorized to appoint a committee of three from the territory of the Southern Division to prepare a report on the possibilities of incorporation, this report to be made by August 1, 1933, to be circulated to the membership by the secretary, and to be made the subject for a special meeting of the Board; the committee as appointed consists of W. L. Chambers, chairman, J. McB. Robertson, and George Willett.

The report of the editors was submitted by Joseph Grinnell, together with a statement of "Principles governing selection of manuscripts for The Condor" which forms Appendix A of these minutes. This "code" has been evolved in part as a result of receipt of twice as much manuscript as the Club can publish. Despite an anticipated cut in the size of The Condor for 1933, reduction in printing costs per page and other economies make it seem probable that 264 pages will be printed in the 1933 volume. Upon motion by Tyler, seconded by Pierce, the report was accepted and the editors thanked for their services.

The Business Managers' report was offered by J. McB. Robertson. This report forms Appendix B of these minutes. A summary of the report was circulated to members of the Board in the call for the annual meeting. Mr. Robertson also furnished a statistical statement of the membership of the Club and the circulation of The Condor for the past year and a half. This statement forms Appendix C of these minutes. In summary, the Club membership as of May 1, 1933, was as follows: honorary members, 10; life members (living), 61; life subscribers, 1; members in good standing, 615; members in arrears, 113; members being carried, 46; complimentary copies, 23; subscribers in good

standing, 93; subscribers in arrears, 12; subscriber being carried, 1; exchanges, 73; total, 1048. Since January 1, 1933, \$300 of the endowment fund has been invested in U. S. Bonds, the Club's total investment in these securities now being \$11,200. The auditing committee checked the bonds in the presence of Mr. Chambers. No losses occurred as result of the impounding of funds in the Southern County Bank. Upon motion by Carriger, duly seconded, the report was accepted and the business managers thanked for their services.

Messrs. Swarth and Dixon were appointed to present a resolution respecting Barton Warren Evermann, long a member of the Board of Governors. This was accepted by a rising vote. The resolution follows:

In the death of Barton Warren Evermann, on September 27, 1932, the Cooper Ornithological Club and the Board of Governors thereof have lost a member whose personality and influence have been important factors in the activities of our Club during the many years of his association with us. Therefore be it

Resolved, that the Board of Governors of the Cooper Ornithological Club hereby expresses its deep sorrow at the loss of this valued member. And be it further

Resolved, that the Secretary be instructed to transmit a copy of these resolutions, together with the sincere sympathy of the Board of Governors, to the members of Dr. Evermann's family.

Election of officers resulted as follows (by secretarial ballot): President, L. H. Miller; Vice-president, Joseph Dixon; Secretary, T. I. Storer; Editor, Joseph Grinnell; Associate Editors, J. M. Linsdale, A. H. Miller; Business Managers, W. L. Chambers, J. McB. Robertson.

The Secretary was instructed to write a note of thanks to Mr. Joseph Mailliard for his many services to the Club. The Board also expressed its appreciation of the courtesy of Mr. and Mrs. Wright in entertaining them.

The President was authorized to appoint a committee from the province of the Southern Division to audit the Business Managers' accounts for 1933.

A letter from Mr. Clinton G. Abbott, member of the Board, and Director of the San Diego Natural History Museum, dated April 20, 1933, extended an invitation for the 1934 meeting as follows: "On behalf of the San Diego Society of Natural History would you or the proper officer please convey to the meeting the invitation of the Society to the Cooper Club to hold its next meeting under our auspices here in San Diego." This was referred to the officers of the Board. Adjourned.—TRACY I. STORER, *Secretary*.

